

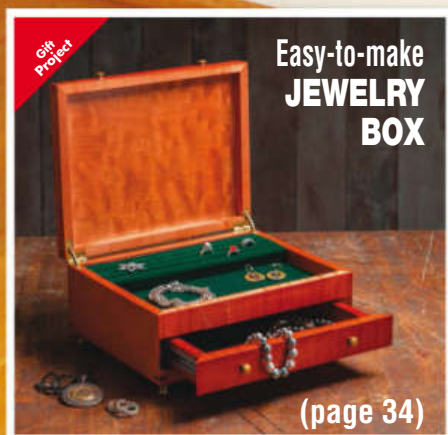
WOODWORKER'S JOURNAL

"America's leading woodworking authority"™

Stickley Inspired Plant Stand

PLUS:

- Animated Carousel
- Keepsake Box
- Classic Table Lamp



December 2015

\$5.99



7 33175 57143 2

**Holiday Gifts
You Can Make!**

RYOBI**PHONEWORKS**

TRANSFORM YOUR PHONE INTO YOUR SMARTEST TOOL

**VIEW**

with your phones HD full color display

**SHARE**

measurements, photos, videos and other project details via email and text

**TRACK**

project locations with GeoTags or GPS labeling

**DOCUMENT**

and save project details with photos or video

**LASER DISTANCE MEASURER**

**FREE
CARRYING
CASE**

\$19⁹⁵ VALUE



**LASER
DISTANCE
MEASURER**
\$69⁹⁷



**INFRARED
THERMOMETER**
\$39⁹⁷



**MOISTURE
METER**
\$29⁹⁷



**LASER
LEVEL**
\$39⁹⁷



**WIRELESS
INSPECTION
SCOPE**
\$89⁹⁷



**NOISE SUPPRESSING
EARPHONES WITH
MICROPHONE**
\$19⁹⁷



**STUD
FINDER**
\$19⁹⁷



**LASER POINTER/
TRANSFER LEVEL**
\$14⁹⁷



BUY ANY PHONE WORKS™ TOOL \$29.97 AND UP AND RECEIVE A FREE CASE INSTANTLY

To check phone compatibility and learn more, go to:
RYOBITOLS.COM/PHONEWORKS

App available on the App StoreSM and Google Play™. Optimized for iPhone® (iOS 6.0 or later) and most ANDROID™ phones (version 4.0 or later). Google Play and Android are trademarks of Google Inc. iPhone is a trademark of Apple, Inc. App Store is a service mark of Apple Inc. Apple is not endorsing, sponsoring or otherwise affiliated with this product. Application screens may vary. Some products sold separately.

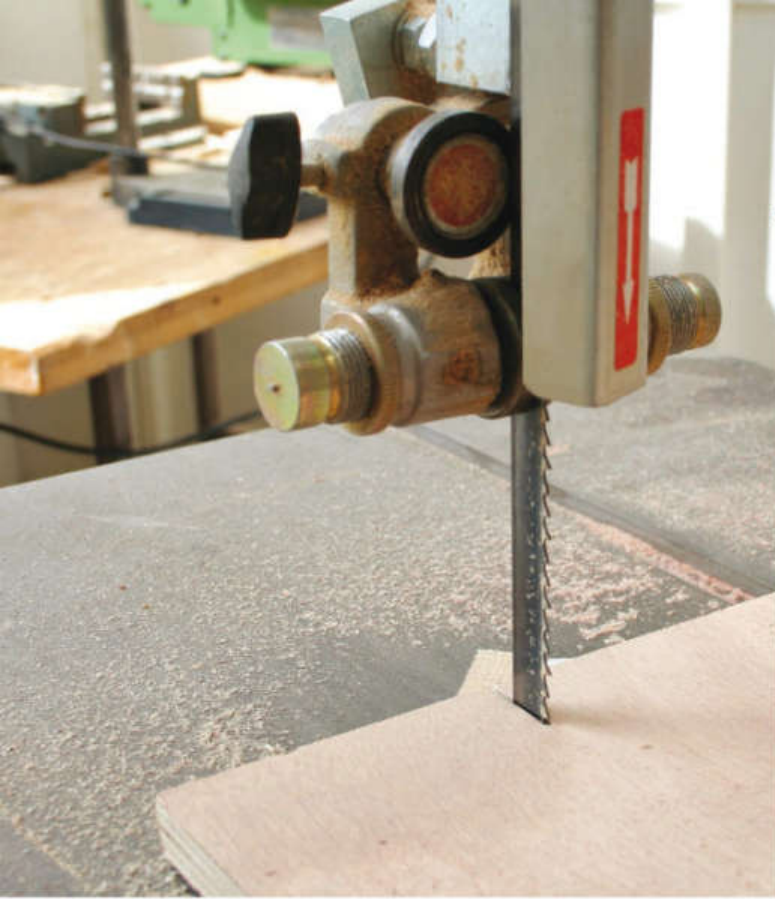
**DOWNLOAD
THE FREE APP**

available at



Exclusively at





Sawblade.com features the finest blades from manufacturers like Freud, Diablo and our proprietary QSAW® line.

The legacy of fine craftsmanship begins with the finest of saw blades.

You've got your name on it, and your heart and soul in it. It's meant to last not a lifetime, but several. At Sawblade.com we like to say, "The better the blade, the better it's made." That's why we carry the complete line of blades from Freud and Diablo as well as our own German engineered, American made QSAW® line of wood-cutting blades. When precision matters, when craftsmanship matters, when your legacy and pride in your work matters, then the blades you choose matters as well. Add to that our knowledge and expertise, along with really great pricing, and now you know why Sawblade.com is the best place to start your next project.

Sawblade.com offers custom welded band saw blades



- Manufactured with precision ground tooth
- Computer controlled hardening
- Custom welded to any length

Ideal for the woodworking industry, our custom welded blades feature spring-tempered backs and precisely hardened teeth allowing for very accurate cuts.

SAWBLADE.COM
RUN LEAN

800.754.6920

Woodworker's Journal

Contents

December 2015

Volume 39, Number 6

Projects



Page 34

Classic Mitered Jewelry Box

GIFT!

By Brad Becker

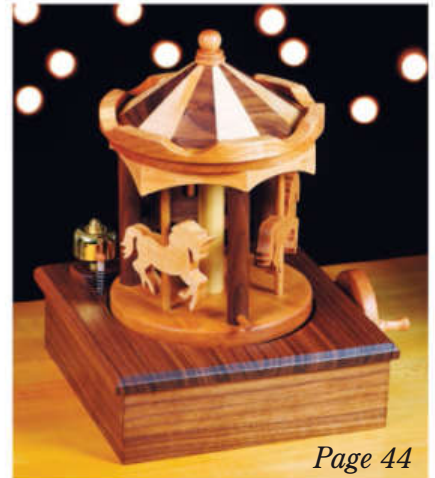
Figured maple, attractive hardware and contrasting splines enhance a box of beauty.

GIFT!

Carousel

By Sandor Nagyszalanczy

You'll feel as if you've successfully grabbed the brass ring when you complete our carousel with its moving parts.



Page 44



Page 28

Stickley-Inspired Plant Stand

By Chris Marshall

Gentle curves and an increase in height update a classic style, while a fumed ammonia finish maintains its ties to the past.

Hexagonal Table Lamp

By Larry Okrend

A band saw plus a tapering jig — that we'll show you how to make — are the tools you'll need for this hexagonal lamp.



Page 66

GIFT!

Fancy Keepsake Box

By Bruce Kieffer

Varied woods, a leather-covered bottom insert and a closure with magnetic catches comprise this tiny treasure.



Page 40

UNACCEPTABLE.



**THIS SAW STOPS ON
CONTACT WITH SKIN.**

SawStop.com



Departments



8 Letters

Inspiration from our authors for readers' own projects.

14 Tricks of the Trade

Easily mark screw placements.

16 Questions & Answers/Stumpers

Which direction do you install sanding belts? How do you cut circles? What about brushless motors?

20 Shop Talk

Woodworkers' winning projects from across the country — from Indiana to San Diego.

24 Woodturning

Up the handmade component to your furniture by turning your own knobs, handles and wheels.

52 Tool Preview

Anatole Burkin takes the every-woodworker approach to putting the consumer model Full Spectrum H-Series Desktop Laser through its paces.

58 Tool Preview

The Piranha FX is a CNC router, a laser engraver and a 3D printer — all in one machine. Rob Johnstone tells you all about it.

78 What's in Store

Innovations in tools.

86 Finishing Thoughts

Michael Dresdner presents you with options for finishes that are simple, swift and safe, whether you want your project to appear colored or clear.

90 Hey ... Did You Know?

Woodworking tools that are, literally, music to your ears — plus trees that store water.

woodworkersjournal.com



I have exciting news! As a subscriber to *Woodworker's Journal*, in addition to the magazine, you'll soon have free access to every past issue of the magazine. It's true! As a special new benefit for you and your fellow subscribers, we're giving you exclusive access to every plan and article printed from 1977 up to the most recent — plus new subscriber-only videos, articles and plans! It will all be available to you on

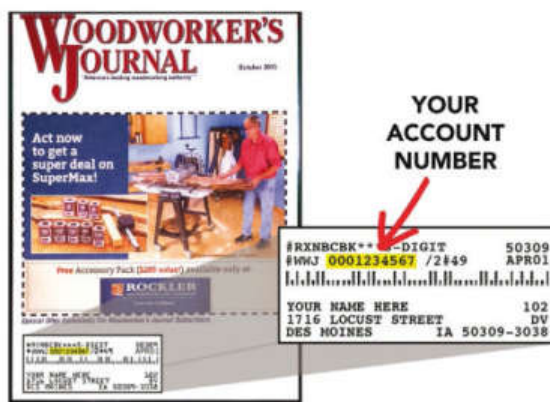
www.woodworkersjournal.com/

Starting in January, all you'll have to do to open your exclusive premium content is identify yourself as a current *Woodworker's Journal* subscriber. The easiest way to do that will be with your account number. You can find your account number just above your address on the mailing label that's stuck to the cover of every issue (see example in the photo). Make a note of your account number, and you'll be ready when our premium content goes live in January.

— Dan Cary



★ **NEW SUBSCRIBERS-ONLY BENEFIT** ★
PREMIUM ONLINE CONTENT!
EVERY PAST ISSUE, PLANS AND VIDEOS!



How do you make the most-advanced Kreg Jig® even better? **Make it a Master System!**

The all-new Kreg Jig® K5 Master System combines the advanced features of the Kreg Jig® K5 with premium accessories that make pocket hole joinery even faster and easier.

The Kreg Jig® K5 Master System includes

- Our flagship Kreg Jig® K5.
- Kreg® Portable Base for building on the go.
- 3" auto-adjusting Automaxx® Face Clamp.
- Project plans to get you building right away.



Automaxx® Face Clamp



Portable Base



3 Project Plans

The Kreg® System Organizer— The Storage Solution for Kreg Jigs® and Accessories

The all-new Kreg® System Organizer keeps everything needed for Kreg Joinery™ in one convenient place. Custom inserts cradle and protect your Kreg Jig® (K5, K4, or K3 models) and accessories, plus Kreg® clamps, Kreg® Screws, and more.



www.kregtool.com | 800.447.8638



CNC PIRANHA Fx CARVES, LASER ENGRAVES AND 3D PRINTS

THE MAKE ANYTHING MACHINE.

- Carve, Laser & 3D Printing Modules
- Copy/Recreate with the optional digitizer
- Works on wood, aluminum, soft metal, and plastic
- Easy to use with robust, professional capabilities
- Design software included

**From small shop production
to idea fabrication...**



Optional Digitizer



3D Printing



Laser Engraving



Metal Carving



www.nextwaveautomation.com

**Next Wave
Automation**

It's More for You



WE ARE GIVING YOU ALL THE STORIES!

Perhaps you've heard of this amazing new thing ... it's called the Internet. And, while I am not an expert, I have it on good authority that it is pretty cool and it's here to stay.

All kidding aside, the *Woodworker's Journal* has been an industry leader on the Internet for many years now with our award-winning eZine and our newly revamped and

mobile-responsive website. But one thing I can tell you about the web is that it is always changing, and to stay relevant you need to embrace that change and move forward with the times.

With that as our motivation, I am happy to announce a new benefit just for our print magazine subscribers. Starting in January 2016, print subscribers will have exclusive access to new and more extensive content on our website. By being a print subscriber, you will have access to exclusive offers, all of the back issues of the magazine in PDF format, current print content online and much more. All of this content will be searchable, much of it will be printable, and all of it will be for print subscribers only.

To access this premium content, you will need to log in with your subscriber number, which is found on the protective cover on your issue of the magazine. (So don't throw that cover sheet away!)

Now, I can almost hear some of you asking ... what is the catch? Is the print magazine going to change? The answer is: no catch, and no changes, it's just good news.

— Rob Johnstone

In-Store Mats for Your Tools

In reply to a letter in *Questions & Answers*, August 2015 issue by Lee Nalley on shop flooring: I use horse stall/trailer mats. They are 3/4" x 4' x 6'. I have used thicker mats and found they tend to cause me to trip on occasion. I have also used gel-filled mats, but they seem to be too soft for me. These are solid rubber, rough on the bottom, and never slide out of place. They can be found at a farm supply store.

Charles Cox
Yukon, Oklahoma

I built a room onto my workshop and put stall mats on the floor. They are hard enough that wheels on machine carts don't leave



marks. Around here, they come in a 4' x 6' size, and they are pretty heavy so they don't move around.

Beverly Taylor
Plantersville, Texas

Continues on page 10 ...

ROCKLER PRESS

THE VOICE OF THE WOODWORKING COMMUNITY

DECEMBER 2015

Volume 39, Number 6

ROB JOHNSTONE *Publisher*

JOANNA WERCH TAKES *Editor*

CHRIS MARSHALL *Senior Editor*

JEFF JACOBSON *Senior Art Director*

JOE FAHEY *Associate Art Director*

DAN CARY *Senior Web Producer*

MATTHEW HOCKING *Internet Production Coordinator*

MARY TZIMOKAS *Circulation Director*

LAURA WHITE *Fulfillment Manager*

Founder and Chairman

ANN ROCKLER JACKSON

Publisher Emeritus

LARRY N. STOIAKEN

Contributing Editors

NORTON ROCKLER

SANDOR NAGYSZALANCZY

ERNE CONOVER

Advertising Sales

ALYSSA TAUER *Advertising Director*
atauer@woodworkersjournal.com

DAVID BECKLER *National Sales Representative*
dbeckler@woodworkersjournal.com
(469) 766-8842 Fax (763) 478-8396

Editorial Inquiries

JOANNA WERCH TAKES
jtakes@woodworkersjournal.com

Subscription Inquiries

(800) 765-4119 or
www.woodworkersjournal.com
Write *Woodworker's Journal*, P.O. Box 6211,
Harlan, IA 51593-1711

email: WWJcustserv@cdsfulfillment.com. Include mailing label for renewals and address changes. For gift subscriptions, include your name and address and your gift recipient's.

Book Sales and Back Issues

Call: (800) 610-0883
www.woodworkersjournal.com

Other Questions or Problems

Call: 763-478-8255
rjohnstone@woodworkersjournal.com

Woodworker's Journal (ISSN: 0199-1892), is published in February, April, June, August, October and December by Rockler Press Inc., 4365 Willow Dr., Medina, MN 55340. Periodical postage paid at Medina, Minnesota and additional mailing offices. Postmaster: Send all address changes to *Woodworker's Journal*, P.O. Box 6211, Harlan, IA 51593-1711. Subscription Rates: One-year, \$19.95 (U.S.); \$28.95 U.S. funds (Canada and other countries). Single copy price, \$5.99. Reproduction without permission prohibited. Publications Mail Agreement Number 0861065. Canadian Publication Agreement #40009401.

©2015 Rockler Press Inc. Printed in USA.

WISH-LIST * WISH-LIST * WISH-LIST * WISH-LIST * WISH-LIST * WISH-LIST

Put the NEW AccuMASTER Angle Gauge on your holiday wish-list

A GREAT STOCKING STUFFER – as **LOW** as \$19⁹⁵!



All the *best* features:

- True 2-in-1 – absolute level and relative angles in degrees, percent, IN/FT, mm/M
- Large, bright StayGlow™ display stays on while using
- New MEMS sensor for better accuracy, longer battery life
- Reversible display, Hold function, magnetic grip
- 2-Year Warranty

AccuMASTER™

Buy now, limited time offer!

www.calculated.com/santa
or call toll-free 800-854-8075

Reg. \$39⁹⁵ – NOW \$24⁹⁵
or 2 or more for \$19⁹⁵ each
+ FREE SHIPPING

Offer ends January 31, 2016.

CALCULATED INDUSTRIES®

Keep the Tradition Alive

Leigh Jigs make Dovetails perfectly and easily every time.



LEIGH
Celebrating over 30 years

SEE VIDEO

leighjigs.com
or call 800-663-8932

TOUGH Dries Natural Color, No Foam GLUE



Gorilla Wood Glue's premium formula creates a cross-linking bond to provide superior strength with a Type II water resistance, indoors and out.



For the Toughest Jobs on Planet Earth®

www.gorillatough.com

©2015 The Gorilla Glue Company



Kimberly McNeelan's Bar Stool project had just the right timing for reader Ben Dady.

Good Timing, Kimberly!

Thanks to WJ and Kimberly McNeelan for her timely article and plans on the Bar Stool [*Small Shop Journal*, August 2015]. I had just finished a stand-up desk of maple and cherry and thought it would be good to have something to sit on when I didn't want to stand. I made it taller and made a half-moon on the

bottom of the legs to match my desk, but otherwise I used her plan. (Hand-cut dovetails are hard, even after practicing on six sets before doing it for real.)

Ben Dady
Lookout Mountain, Georgia

Ernie: An Inspiration

In your August 2015 issue, Ernie Conover's article about spindle turning [*Woodturning*, "Who Says a Spindle Has to Be Round?"] shows two antique screwdrivers with flat spots on the handles. In addition to the reason for the flat spots that he mentions, they also prevent the screwdrivers from rolling off the work surface.

Wes Sargent
Phoenix, Arizona

These screwdriver handles were turned with flat spots for alignment clarity, more torque — and so they don't roll away.



Harold Horchover found that Ernie Conover's turned jar lids inspired him to make some of his own.

I am grateful for the value in Ernie Conover's wood-working articles. I was able to eliminate the vibration in my grinder using his advice and recommendations, and he provides pleasure and entertainment. The article on "Working Turning into Your Daily Life" in the June issue has provided me much fun with my box of scraps too nice to toss.

Harold Horchover
Trabuco Canyon, California

water-based products, for me, is the dead-appearing results because of their lack of penetration — as demonstrated in your image that compares solvent and water-based finish on maple. This lack of grain accentuation may be desirable to some, but for the most part, I like to see the grain pop.

Paul A. Otto
Lewiston, New York

Continues on page 12 ...

Water-based Finishes? Still Not a Fan

I read with interest *Finishing Thoughts*, "Water-based Coatings," in the August issue. In my past experience with water-based finishes, I limited my use of these products to projects where the long curing time and subsequent out-gassing of solvents was offensive, such as children's furniture like highchairs, cribs and cradles. Customers hesitated to use these products as long as the solvents were still curing for weeks after the piece was delivered.

The main problem with



Paul Otto still doesn't like the way water-based finishes look.





SAFE & EFFECTIVE



We've all been there: admiring the craftsmanship of an old end table. Perfect for restoration but it's been painted, and poorly at that. BLUE BEAR® Paint & Urethane Stripper safely and effectively removes multiple layers of coatings in one application. No need for sanding the fine millwork; the gelled formulation removes paint from hard to reach places with ease. The stripper removes latex, enamel, urethanes, as well as two part epoxies. Made with soybeans, BLUE BEAR Paint & Urethane Stripper is low odor, non-caustic, and contains no hazardous chemicals.



Call us today! 800.538.5069

Or visit us online: www.franmar.com

Find a dealer near you: www.franmar.com/find-distributor



Made in the USA



START BUILDING

your dream PROJECT

SAW YOUR OWN LUMBER
12 sawmill models available starting with the LT10 at \$4,395*

Wood-Mizer

*Price subject to change without notice.
© 2015 Wood-Mizer LLC

800.553.0182 | woodmizer.com

OSBORNE Wood Products, Inc.

Your Partner in Kitchen Renovations

Kitchen Posts
Corbels
Brackets
Cabinet Feet
Molding
& More

Order Online
1.866.963.5601
www.woodencomponents.com

There's more online at
woodworkersjournal.com

www.woodworkersjournal.com
MORE ON THE WEB

Check online for more content covering the articles below:

Woodturning (page 24):

Turning knobs, handles and wheels (video)

Stickley-Inspired Plant Stand

(page 28): Process for creating a fumed finish with ammonia (video)

Classic Mitered Jewelry Box

(page 34): Cutting and installing corner splines with Rockler's Router Table Spline Jig (video)

Animated Carousel (page 44):

Watch an animated carousel action, plus process for cutting and assembling its tent top wedges (video)

Tool Preview (page 52):

Using the Full Spectrum H-Series 5th Gen CO2 Desktop Laser (video)

Small Shop Journal (page

66): Making a hexagonal tapered lamp base with a jig (video)



A Screw Type Letter

I read the article covering screws in my wife's copy of *Woodworker's Journal* for August 2015 [*Today's Shop*, "Today's Wood Screw Technology"]. It was well done, for the biggest part, but I do have a few issues.

On drive types, butterfly drive was left out. Yes, it is just about obsolete, but I keep a set of drivers for the rare occasion I need them. I have also found on several applications, a screw drive type that has an eight-point recess, which can take an eight-point driver as well as a #2 square. The square does not provide quite the driving power before stripping the socket out, but it is usable. I have no idea where they come from.

Now to the big problem. When one is using screws to clamp two pieces of wood together, a shank that has threads occupying both pieces will not pull them together. The relationship of the work as the screw passes from one to the other piece of wood will most likely stay as it is. Continued turning

of the screw will only drive it deeper. A shank chosen to have no threads in the top piece or a shank clearance drilling is required.

Also, using a self-drilling/-tapping screw in serious hardwoods is a mistake. Sugar maple, some dense oaks and Osage orange and most burls and crotch wood will not allow such screws to be used and achieve a good result. Either the screw breaks off or the wood splits. Many tropical woods fall into this category also. Working with softer "hardwoods" usually does not present such problems.

Wax as a lubricant can be a help, but putting wax on a self-drilling/-tapping screw is a waste of time. The technique works best with the old



Lubricating screws to help drive them into wood fibers is just one trick for using them successfully.

style wood screw or one with a large, unthreaded shank portion. Fill the threads with



Our reader believes that waxing screw threads works best with traditional tapered wood screws.

beeswax, insert the screw into the shank clearance hole, and push down until the threads make contact with the bottom piece. Then, as you drive the screw in, the shank forces the wax forward into the pilot hole and makes the drive easier. The smooth shank in the close-fitting clearance hole acts like a piston. Any other use of wax will not give results as good.

All in all, I would say that taking the time and putting forth the effort to use screws properly is time and effort well spent.

Gary Charniga
Sheldon, Missouri



LASER ENGRAVE IT. CUT IT. MARK IT.

The finishing Touches Start Here.



Desktop Systems Starting at \$7,995



The Proof is in the Results

Creating your own inlays, custom cabinets, and photo engravings has never been so easy. Epilog's versatile lasers allow you to etch, engrave, and cut intricate shapes and designs in a matter of minutes.


Contact Epilog Laser today for a laser system demo!

epiloglaser.com/wwj • sales@epiloglaser.com • 888-437-4564

MADEINUSA
Golden, Colorado

"I was burned out with the corporate world and looking to take control of my income and create security for my future. I found Furniture Medic® and realized this might be an *opportunity* to turn the hobby that I love into a business and over 10 years later I am still very glad that I did!"

- Bob Borkovec, Furniture Medic Owner



HOW BIG ARE YOUR
Dreams?

Turn your passion for
woodworking into a business.

Furniture Medic offers:

- National Account Repair*
- Insurance and Moving Claim Repair*
- Training, Marketing & Sales Resources

*not available in all locations.



FURNITURE MEDIC®

Furniture Medic Limited Partnership | 3839 Forest-Hill Irene Road | Memphis, TN 38125
© 2015 Furniture Medic L.P. All rights reserved.

Contact Chris Beck at
888.841.0634
furnituremedicfranchise.com

The opinions and results expressed are those of an individual Furniture Medic franchise owner. Other owner's individual results may vary depending on the individual, the individual's business efforts and the market. The offer of a franchise can only be made through the delivery of a Franchise Disclosure Document. Furniture Medic L.P. Minnesota File No. F7440.

Tricks of the Trade



Solutions for Filling Holes and Gaps

Tested and photographed by Chris Marshall



Foam Backer Rod Keeps Holes Finish-free

Often it makes sense to prefinish parts before assembly, but how do you keep wet finish out of dowel or shelf-pin holes? Here's what I do. I cut short pieces of foam backer rod that's sold at hardware stores for filling gaps behind caulk. Its form-filling resiliency plugs the holes nicely. Use a rod diameter slightly larger than the holes you're covering. Apply finish, then remove the plugs before it dries.

John Cusimano
Lansdale, Pennsylvania



Easy Way to Install Threaded Inserts

Threaded inserts can be hard to start straight into their pilot holes. Here's a foolproof solution. First, cut the head off a machine bolt, and thread a nut onto it. Chuck the bolt shank into your drill press, and thread the insert onto the bolt and against the nut. With the drill press unplugged, you can now use the quill to press the insert down against its pilot hole squarely, while turning the chuck by hand. Once it's threaded into the wood a few turns, you can unclamp the drill press chuck and finish the job by twisting the nut with a wrench the rest of the way to seat the insert.

Bill Wells
Olympia, Washington



Quick Shop Vac Switch

If you get tired of walking back and forth between your saw or other stationary tools to turn the shop vac on and off for dust collection, try this: clamp a power strip within easy reach of the tool you're using. Then plug your shop vac into it, and flip the vac's switch on. Now you can use the strip's On/Off rocker switch to activate the vacuum instead.

John Stahr
Chicago, Illinois

Spacer Makes Laminate Safer to Cut

Plastic laminate is thin enough to slip into the gap under a table saw rip fence, presenting a real safety hazard. To prevent that from happening, I set this plywood spacer against my fence. It's just a long strip of 1/4" plywood with a scrap glued on one end that forms a lip over the front edge of my saw table. The spacer covers the fence gap, and the lip holds it in place as I push the laminate through the cut. It works great!

Dan Martin
Galena, Ohio





PICK OF THE TRICKS

Indentations Set Screw Placement on Drawer Faces

Here's an easy way to lay out the screw holes on drawer faces

for handle hardware. Cut the heads off a spare pair of screws that fit the handles, and thread them in. Then set the handle in place on your drawer face and tap it with a soft mallet. The screw shanks will leave indentations that show you exactly where you need to drill the through holes.

Tim Sanchez
Bayfield, Colorado



In addition to our standard payment (below), Tim Sanchez of Bayfield, Colorado, will also receive a RIDGID 10" Dual Bevel Miter Saw (R4112) for being selected as the "Pick of the Tricks" winner. We pay from \$100 to \$200 for all tricks used. To join in the fun, send us your original, unpublished trick.

Please include a photo or drawing if necessary. Submit your Tricks to Woodworker's Journal, Dept. T/T, P.O. Box 261, Medina, MN 55340.

Or send us an email:
tricks@woodworkersjournal.com

Safety First Learning how to operate power and hand tools is essential for developing safe woodworking practices. For purposes of clarity, necessary guards have been removed from equipment shown in our magazine. We in no way recommend using this equipment without safety guards and urge readers to strictly follow manufacturers' instructions and safety precautions.

We built it for us,
but you can have one too.



FREE TOOLBOX
\$499 Value
With purchase of any CNC and stand - Model 1201

We set out to build the industry's finest compact CNC router. Accuracy. Repeatability. Quality. Ease of use. Support. All of the things that are important to you, are important to us too. We're a team of woodworkers who share a passion for CNC technology. Models starting at only \$1,999! Call or visit us online today to learn more.

AXIOM
PRECISION
www.axiompprecision.com
(844) 642-4902

Questions & Answers

Looking for Direction

THIS ISSUE'S EXPERTS

Dave Mansfield is marketing manager at Saint-Gobain Abrasives North America, manufacturers of Norton Abrasives.

Chris Marshall is senior editor of *Woodworker's Journal* and author of several books on woodworking.

Joanna Werch Takes is editor of *Woodworker's Journal*.

Contact us

by writing to "Q&A,"
Woodworker's Journal,
4365 Willow Drive,

Medina, MN 55340,
by faxing us at (763) 478-8396

or by emailing us at:

QandA@woodworkersjournal.com

Please include your home
address, phone number and
email address (if you have one)
with your question.



Does it matter which direction you install your sanding belt? Short answer: sometimes yes, sometimes no.

sandblasting the backing on each end and placing a tape in that channel to hold the ends together. All "butt" joints are bidirectional, which means they can be put on the sander in either direction and work fine.

— Dave Mansfield

Q I've had three different sanders over the years, with the belts labeled with an arrow indicating direction of rotation, and I've not had any problems with the belts. Usually they will wear out. But lately the belts aren't marked. I've tried putting them on with the writing facing me and away, and different brands, all with the same outcome: breaking or coming apart at the joint. I recently started using bulk sanding belt material on my 16/32 JET drum sander and it, too, doesn't have any arrows. Is there a right or incorrect way to install these belts?

—Jim Becker
Waunakee, Wisconsin

A On most belts, if they are directional, the backing will have an arrow on the back to let you know which way

the belt goes on the sander. The main reason a belt can only go in one direction is because the joint or splice on the belt is a "lap" joint. This means that one end of the belt is put on top of the other end when joining the two ends together. If the edge of the bottom material is going in the wrong direction, it will catch on the workpiece and tear the joint apart.

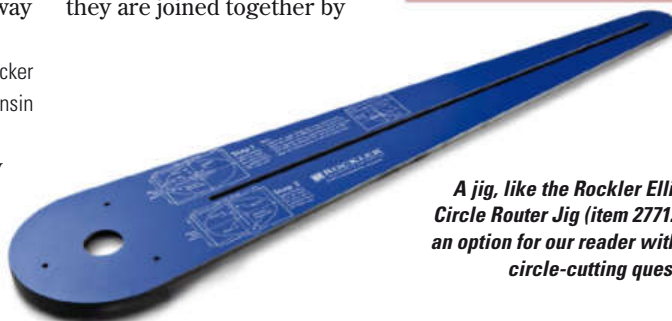
For all of our portable belts, we offer what we call a "butt" joint, where each end of the belt butts up against each other and they are joined together by

Q I want to cut accurate circles in a top grade of plywood to be made into lazy Susans. I would like to know the best method, as well as tools or jigs, to accomplish this. What do you suggest?

— Bob Koenig
Lansdale, Pennsylvania

A If I was making just one lazy Susan, I'd probably use a plunge router mounted on a circle-cutting jig. Drill a small center hole partway into the bottom face of the plywood (where it won't

Continues on page 18 ...



A jig, like the Rockler Ellipse/Circle Router Jig (item 27712), is an option for our reader with the circle-cutting question.

HOLD IT.

WHO SAYS YOU CAN'T TEACH AN OLD DOG NEW TRICKS!

INTRODUCING ARMOR'S REVOLUTIONARY
NEW DOG PEG SYSTEM
Consistent Pressure—Any Size



THE "COOL" OF THE TOOL!
PATENTED AUTO-ADJUST MECHANISM



ARMOR™
TOOL

888.695.3055
armor-tool.com

NEW SNAP-CHECK Digital Gauge SNAP-CHECK Makes Setups a SNAP!

FEATURES:

- Measures Range 1/4" Depth to 2" Height
- Smooth Spring Plunger Movement
- Rare Earth Magnetic Base

EASY-TO-READ DISPLAY:

- .0005" Decimals
- .01 Millimeters
- 1/64" Fractions

\$19.95



Watch the Video – ORDER YOURS TODAY!

chipsfly.com

513.233.9019



Ball-Tip Anvil
Included

Goes
Farther
Dries
Faster
Looks
Fabulous

ZAR® Oil-Based Wood Stain
wipes on like furniture
polish to stain and seal
in one quick, easy
application. It gives wood
a natural range of color
and enhances the wood
grain. Our full bodied
formula covers more square
feet and dries faster than
other wood stain products.



OUR NEW LOOK

To download a ZAR Interior
Wood Finishing Project Guide
or to find a dealer near
you visit www.ugl.com
or call 1-800-272-3235.

Stumpers

A Few Mop Up

Tool a “ringer” for other items



What's This?

Henry Dechief of Chilliwack, British Columbia, bought this mystery at a garage sale. Do you know what it is?

Send your answer to stumpers@woodworkersjournal.com

or write to “Stumpers,”

Woodworker's Journal, 4365 Willow Drive, Medina, MN 55340 for a chance to win a prize!



Woodworker's Journal editor Joanna Werch Takes compiles each issue's Stumpers responses — and reads every one.



Some thought the August mystery tool submitted by **Mark Patrick** of Ionia, Michigan, sparked memories, like this from **Geno Beniek** of Rice, Minnesota: “I recognize the gear configuration from the hours I spent as a kid turning the crank on a sausage stuffer.” Or, from **Louis C. Luersen** of Granbury, Texas: “My grandmother used hers to knead bread.”

Some had other ideas. “I believe the item is for making rope,” said **Tim Bowen** of Oberlin, Kansas. **Frank Puia** of Ashland, Massachusetts, thought it was “an early crimper for air ducts.”

By far the most popular guess was the one made by **Steve McNeal** of Bedford, Texas (and many, many others): “It is a paint mixer or any other liquid or powder that needs mixed.”

To be fair, there were context clues. **Anthony Scicluna** of Marysville, Washington, “look[ed] at it a few times and notic[ed] that it has paint stains on it.” But **Le Volberding** of Dayton, Nevada, took the detective skills a bit further. “It couldn't be a milk stirrer because of all the gunk on it — unsanitary!” Le

Winner! Chuck Delehanty of Joliet, Illinois, wins a Hitachi GP10DL 12V Peak Lithium Ion Mini Grinder. We toss all the Stumpers letters into a hat to select a winner.



An heirloom from Gene Trine's family was a mystery tool.

said. “The more I looked at it, the more I thought of it for wringing out cloth like sheets or towels.”

Closer, but no cigar.

Then **Richard Shea** of Cambridge, Massachusetts, wrote, “The tool is the end of a wringer/rag mop. The user would loosely wrap old towels or rags over the hook, around the elbow, and through the eye, before knotting the ends of the rags together. After rinsing the mop, a few turns of the crank would twist the rags, wringing out excess water.”

The other reader who correctly identified the tool verified Richard's answer. **Gene Trine** of Madison, Nebraska, wrote:

“The item is the ringer portion of a ‘Ringer Mop’ invented by my uncle, Ralph Trine, in the 1920s or '30s. Ralph passed away in 1978. He was an ardent inventor and tinkerer. Unfortunately, he didn't get rich enough to pass any of it on to me.”



Questions & Answers

continued

show anyway), set the circle-cutting jig to the radius of circle you want, and then cut the circle round in a series of several deeper passes with the jig's centerpoint fixed in the pilot hole. Either a straight bit or an upcut spiral bit will do this job, but be sure to use sharp bits to minimize splintering when the bit passes through to the other “show” face of the plywood.

You can buy circle-cutting jigs, or make them. For one plan, see Sandor Nagyszalanczy's “Circle-cutting Jig with Fine Adjustment” in our February 2015 issue.

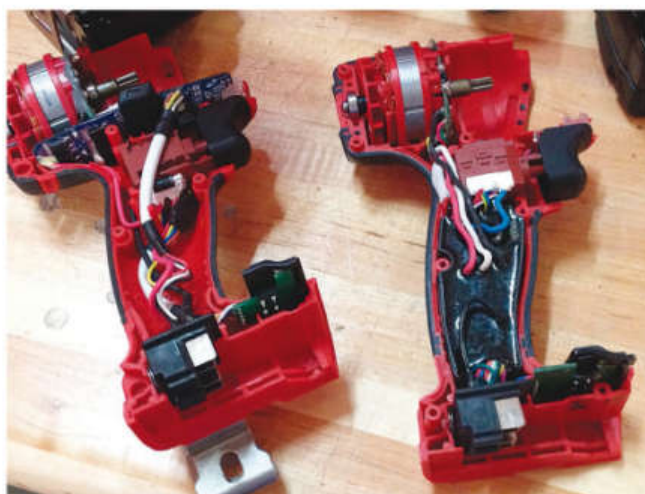
Alternately, you could cut these circles on a band saw using a circle-cutting jig made for that machine. A band saw with a sharp, fine-tooth blade will provide clean edges, and it's easy to find plans for a band saw circle-cutting jig online. Still a third method would be to cut a round template from 1/4" or 1/2" MDF or Baltic birch plywood. Then cut your plywood lazy Susan tops slightly oversize, secure the template to them with a few pieces of double-sided tape, and use a pattern or flush-trim bit in your handheld or table-mounted router to trim them to final size. This last method is probably the most “goof-proof” and could also provide you with the cleanest edges for banding with wood or veneer. If I were going to make lots of lazy Susans, this last option would be my pick. It's fast and simple.

— Chris Marshall

Q These new brushless motors seem to have all the advantages over the old brush type and will replace them entirely (maybe). But I wonder if they have some drawback? For instance, nobody seems able to tell me whether one of these would have an adverse effect on my pacemaker.

— Moh Clark
Marble Falls, Texas

A Be still, your beating heart! Brushless motors won't impact your pacemaker. What they will do is decrease the amount of friction on your tool's motor



Any drawbacks to brushless motors, found in Milwaukee Tool drills, plus many more of your power tools? Well, there's the price ...

(no brushes = no brushing against it), which in turn increases both the efficiency of the tool — there's no brush friction dragging it down — and its life.

Looking for a disadvan-

tage to brushless motors? They tend to cost more in the stores. Like your mom always told you, the best things in life aren't free.

— Joanna Werch Takes



Winner!

For simply sending in his question on brushless motors, Moh Clark of Marble Falls, Texas, wins a General International 7-piece Deluxe 8" Dado Blade Set (item 55-185).

Each issue we toss new questions into a hat and draw a winner.



Howard Feed-N-Wax

Wood Polish & Conditioner

This unique blend of beeswax, carnauba wax, and orange oil enhances the natural beauty and depth of grain on all woods, finished and unfinished.

NO SILICONE OR LINSEED OIL

Perfect For Use On:

- Wooden Crafts
- Hand Carvings
- Antiques
- Furniture
- Kitchen Cabinets
- Radios & Clocks
- Tables & Chairs
- Paneling
- Walking Sticks
- Bathroom Cabinets



**Call 800-266-9545
For A Dealer Near You
www.howardproducts.com**



HOWARD

Feed-N-Wax

Wood Polish & Conditioner

Beeswax & Orange Oil

A penetrating finisher and polish for all furniture, floors and natural woods.

CAUTION: COMBUSTIBLE
Read other cautions on back panel.
CONTENTS: 16 FL. OZ. (473 ml)



Table Extension Slides

Order Online



Equalizer Slides



Standard Slides

**Pedestal & Standard Table Slides
Accommodates 26" - 120" Opening
Same Day Shipping Available**

**1.866.963.5601
www.woodencomponents.com**

Shop Talk

On With the Show



Dale Smith (shown in the inset photo above) won Best of Show for his "Google Locomotive." His "Solid Football" was another entry in the show.

Adventures in Wood at Indianapolis Rockler Store

The crowd at this year's Adventures in Wood Contest at the Rockler Woodworking and Hardware store in Indianapolis, Indiana, was pretty typical of woodworking folks! I say this as a very good thing. Everyone was friendly, interested in what other people made and a little competitive, too.

The projects ranged in style, as did the competitive categories. There were 30 participants (up from 19 from last year) competing for seven awards. The projects were divided into three categories: furniture, turning/miscellaneous and boxes. For each of those categories one could win 1st, 2nd, or 3rd place. Plus, one lucky winner was awarded Best of Show. First place winner of each category took home \$200 of Rockler store credit, and Best of Show was awarded

separately with the prize of \$250 Rockler store credit. Second and third places also got Rockler gift cards.

Dale Smith won Best of Show as well as first place in the turning/miscellaneous category. His project, "Google Locomotive," was a sculptural piece made out of solid walnut. The use of the word "Google" in the sculpture was

subtle, and the walnut was beautifully finished with Watco® Danish Oil.

A common theme in the projects was the use of reclaimed wood. Don Solomon, who won the box category, regularly uses reclaimed wood, including wood from an old smokehouse. His winning entry was "Basketweave with White Roses and Swallowtail," made from 1890s oak. Mark Bachman, who won the furniture category with a sideboard, uses a lot of lumber straight from his property. Second place in the turning/miscellaneous category went to Rallie Murphy for his folk art banjo.

Mark Hensley won in both the turning/miscellaneous category, with third place for his "Pastry Board and French Rolling Pin," and in the furniture category, with second place for his kitchen



Matthew Heiman and his son Oliver show off Matthew's entry "Landscape Diptych 1 & 2," made from cherry and maple.



Don Solomon's "Basketweave with White Roses and Swallowtail" took first place in the Box category. It's made from reclaimed wood.





Mark Bachman won first place in the Furniture category for his Sideboard. Here, he's showing his "Cherry Bandsaw Box" entry.

storage cabinet. His motto is, "You gotta make sawdust. You won't learn unless you are doing." It is safe to say that his experimentation paid off!

We all have different motivation for making things. Family inspiration is a common theme. Matthew Heiman didn't win this year, but his seven-year-old son, Oliver, was there for the opening in full support. Oliver liked his dad's piece the best because of the cool sliding lid. Mark Hensley started woodworking because his father-in-law put him to work. Don Solomon's first wood-

working project was a paddle for his mom to use because he was the oldest of four children, and she needed

all the help she could get. Jim Harper, who placed both second and third in the box category with his "Lacewood Box" and "Jewelry Box," makes a lot of projects for his wife, and she even selects and purchases the unique beautiful wood species herself.

Rounding out the winners was Grant Keeney, who took third place in the furniture category with his "1 Chair."

Whatever the inspiration is for making things, the

Rockler store assistant manager Rue Ann Flanders (left) and manager Paul Haag (right) organized the Adventures in Wood show.

Adventures in Wood Contest is a great way to show off, share camaraderie as makers and compete for some new tools and other supplies from our local Rockler woodworking store.

— Kimberly McNeelan



Mark Hensley's third place entry in the Turning category was a "Pastry Board and French Rolling Pin."



San Diego Show Photos by Andrew Patterson



Jewelry Cabinet by James Frantz

San Diego Show: 34th Year

The San Diego Fine Woodworkers Association last summer hosted the 34th annual Design in Wood show in conjunction with the San Diego County Fair.

Continues on next page ...

Armed Virginia Sloop by Mike Lonnecker



Star Vase by Ed Zbik

Shop Talk continued



*Fine Jewelry Chest
by Robert Denlinger*

From its origins in 1982 with 45 pieces, the show has grown to over 300 entries with awards given out in 24 classes — including, in 2015, an Excellence in Joinery award sponsored by *Woodworker's Journal* and given to Jeff Grossman for his “Table of Transformation.”

Entries for the 2016 show will open around mid-February. Keep watch at www.sdfwa.org/design-in-wood-exhibition or contact coordinator Ed Gladney by phone at 619-251-4410, for more information.



Slim by Brian Huber



Sea Blossom by Frank Andrews



*Featuring Colored Curls
by Tom Edwards*



Serine Travels by Randy Stoner



*Blue Dip by
Scott Lienhard*



*Anniversary -
A Time to Remember by
Rick Olds*



Citraclaro by Michael Broomell



Square Drive Funnel Head Screw

Melamine is no longer the enemy.

Serrations Underneath head create clean hole. No chipping.



Reverse Thread expands entry point for shoulder.



Spiral T17 Point reduces melamine expansion.



Coarse Thread for a powerful hold.



Order Online Today!

www.quirkscrews.com



Engineered Precision

Tough Starts and Fine Finishes

Equipped with a powerful 500W motor and all-metal gearing, the Triton Eccentric Orbital Sander tackles the most demanding sanding and polishing tasks with two sanding modes in one tool.

A forced orbit rotation mode is used for rapid material removal on the toughest surfaces, while free-run random orbit mode delivers fine, uniform sanding results for perfect finishing.

For every sanding task, the Triton TGEOS gets you through the tough starts to leave a fine finish.

TGEOS



triton
Precision Power Tools

tritontools.com

GO VERTICAL

Panel Cutting Made Easy

Horizontal Cuts



Limited Time Offer Only
\$989



Free Lower Extensions!

Vertical Cuts



- One Person Sawing
- Requires Little Floor Space
- Very Safe To Use
- Portable To The Job Site
- Quick and Easy Set Up

www.panelpro.com • 800-599-1655

Woodturning

Turning Knobs, Handles and Wheels

By Ernie Conover

Our woodturning columnist increases the handmade components in his furniture by custom-making his own hardware.

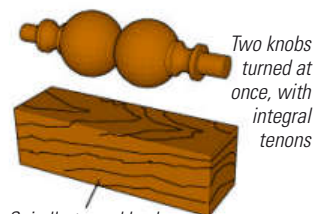


As a furniture maker, I expend a fair amount of effort to fabricate as much of my furniture as possible myself. While screws and nails are a given, I seldom buy hardware beyond hinges. The result is that hand-turned knobs, handles and wheels have become a signature of my casework. I would like to share with you my take on this process and hope it stimulates you to come up with designs of your own. I am sure others can take my ideas to interesting and beautiful new horizons.

Knobs

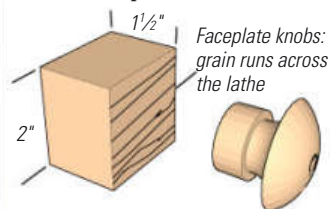
Something that niggles me about almost all knobs is attachment. Most metal pulls are attached with machine screws, while faceplate knobs are traditionally attached with a wood screw. About the only time the screw is tight and the knob doesn't spin is on the day it is installed or when the humidity has been 90% for three weeks running. The rest of the time, which is most of the time, the knob whirls and wobbles every time you tug on it. My methodology ends this problem by attachment

with a dowel. In most case-work, I find that either a 3/8" or a 1/2" dowel works handsomely. With spindle-turned pulls, the dowel can be turned as part of the piece, while



Spindle-turned knobs: grain runs between centers.

the faceplate-turned variety requires the gluing of a dowel as a loose piece.



Three further benefits are derived from hand-turned knobs. The first comes for free and can't be store-bought. By turning everything from one billet, you get a repeating grain pattern in all of the pulls. The second benefit is perspective. In very high-end 18th- and 19th-century chests of drawers, the knobs were graduated. Starting with the biggest knobs on the bottom drawer, the pull on each successive drawer upwards is between 1/16" and 1/32" smaller. This corrects for perspective when a standing viewer looks down at the



Spindle or Faceplate?

drawers, so that all the knobs look to be equal in diameter. It is a nice touch that few will directly perceive — but it's why certain works end up in museums and others don't.

The third benefit is that you can make your own latching mechanism to secure a door. By turning the dowel long enough to go through the door stile, you can attach it to a toggle that



The spindle-turned knob and shop-made latch on this plantation door have been resisting the weather since 2001.

slips behind the face frame stile when you turn the knob. This detail brings delight to all who open the door, once you warn them not to yank, but to gently turn the knob — today's public is accustomed to magnetic catches on cabinetry instead.

Spindle turning is by far the best grain orientation for pulls up to about 1½". That being said, I have successfully spindle-turned 3"-diameter entry door knobs. While theory says that, at some diameter, faceplate turning becomes the better grain orientation due to strength, I am not at all convinced that this is so. Rather, I think that the decision to faceplate turn is stylistic. You get a much different look by faceplate turning. This highlights the fact that wood for a turned knob should always have good cross-grain strength.

Like the perfect grain and diameter match (see top photo at right), an inlaid contrasting dot is also part of my signature. I spindle-turn a contrasting wood to an appropriate diameter, then drill on center with a twist drill that is about .005" smaller in diameter, apply a drop of super glue, and tap the spindle into the hole. After parting off the excess, I turn the remaining excess flush.

Chucking is somewhat problematic with face-



The author makes spindle-turned knobs as a Siamese pair, which ensures a perfect grain and diameter match. He starts by spindle-turning between centers. Then he saws the two knobs apart.

plate-turned knobs. One solution is to lay out with a compass, then band saw rounds. Now drill a blind hole in each blank on the center dimple left by the compass point. Glue in a dowel and grab this in a four-jaw chuck.

To install a shop-made knob, simply drill a hole of the appropriate diameter at the appropriate place, apply some glue, and push it home. Quickly align the grain to the desired orientation. I like to through-drill the holes and have the tenons come flush with the inside face. This allows easy removal if something catastrophic happens. For bombproof installation, split the tenon about two-thirds of its length and drive a wedge from the inside.

I used this technique to attach pulls made from old-time barrel taps with working handles to a maple sugaring-themed cabinet I created for Geauga County [Ohio]'s 2006 Infinitree Project.



The author then grabs the tenon with a four-jaw chuck and finishes the face of the knob.

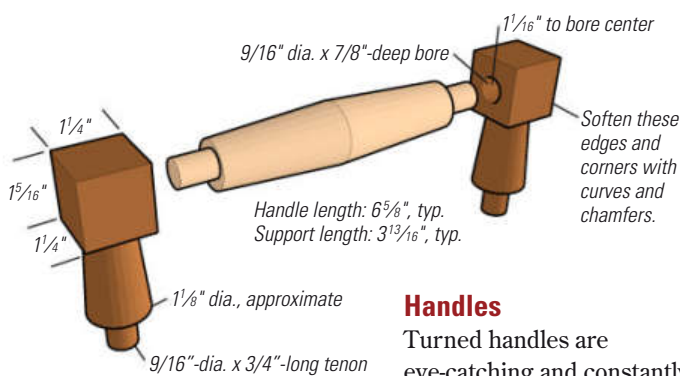


A dot, spindle-turned from a contrasting wood and inlaid in the center of a knob, is a signature of the author's style.



The author chose maple boards with tap holes in them for this cabinet with a maple sugaring theme. He used techniques described in the article to attach the pulls, which are barrel taps with working handles.

Woodturning continued



Handles

Turned handles are eye-catching and constantly garner comment. What is more, they are easy to make from scraps that would likely be thrown away. You can turn round tenons and drill the drawer or carcass for gluing into place, or you can make a square tenon and mortise the carcass. This is the stronger attachment when a lot of weight is involved, such as on a tool chest. My illustration should give any woodworker/turner sufficient information to make your own version.

Wheels

Although most turners only think of toys at the mention of turned wheels, it is possible to make neat turned wheels for a variety of furniture: tea caddies, rolling boxes and mobile stands, to name a few. This is pure faceplate turning. The concept is simple, but there are some tricks to getting nice concentric wheels of uniform diameter. Stock selection and layout is one of these tricks. Wood for wheels

Choose wheel stock with good cross-grain strength.

Tapered pin through cross hole in tenon

Extra piece here increases bore length for functional wheels.

A square axle with turned tenons provides easier mounting.

The author uses a drill press to drill to the axle diameter he has laid out for wooden wheels. Band saw just outside the layout lines.



When turning wheels, pin the blank on an improvised chuck: just a billet with a square-shouldered tenon that is a snug fit with the diameter of the bore.



Once your wheel is turned to the layout diameter, you can scrape the face so that it looks like a wheel and tire, or burn decorative wood spokes.

needs good cross-grain strength and should be planed to uniform thickness.

To create a wooden wheel, lay it out with a compass or dividers, center-punch the center point, and drill in a drill press to the axle diameter. Band saw just outside the layout lines.

Chucking is quite easy: simply turn a very short tenon with a square shoulder that is tight with the center bore. Pin the piece against this improvised chuck. For small bore diameters, you can use a 60° live center directly, but for larger diameters you will need to interpose a piece of wood. Once chucked, turn the piece round with a bowl gouge and/or a scraper. Turn just to the compass line and all the wheels will be the same diameter. You can scrape the face of the wheel to look like a wheel and tire. You can even wood-burn spokes.

On some wheels, the axle can be as simple as a nail. On functional wheels, the axle is a square of wood with each end turned round. Leave the center square for

easy attachment to the box or frame you are adding the wheels to. Cross-drill the axle and tap a tapered pin through to secure the wheel.

I hope you find ways to weave these ideas into your work. Shop-made pulls, handles and wheels really add a unique dynamic to your woodworking projects.

Ernie Conover is the author of The Lathe Book, Turn a Bowl with Ernie Conover and The Frugal Woodturner.

www.woodworkersjournal.com
MORE ON THE WEB

For a video of the author demonstrating his techniques for turning knobs, handles and wheels, please visit www.woodworkersjournal.com and click on "More on the Web" under the Magazine tab.



MOLDERS

7 YEAR WARRANTY

APPLICATIONS

Straight • Curve • Elliptical



Why Settle?
Get the
BEST.

IN-STOCK & CUSTOM KNIVES

www.williamsnhussey.com

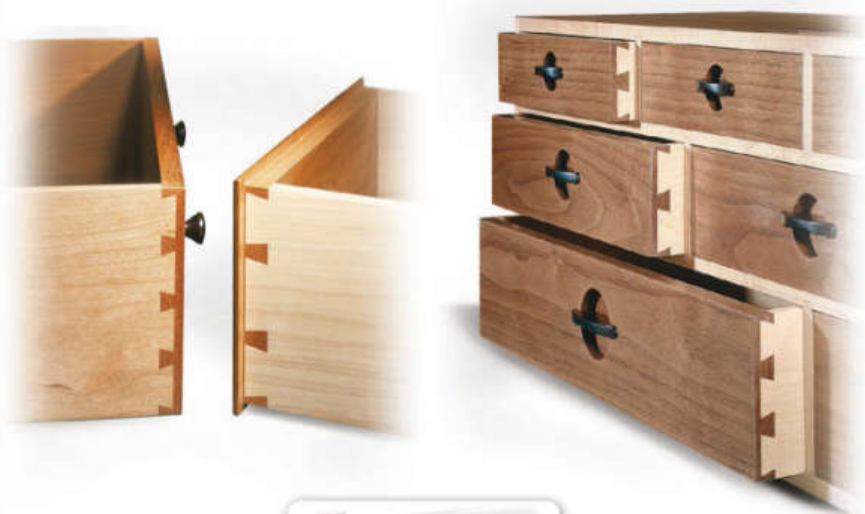
Toll Free 800.258.1380

70 Powers Street • Milford, NH 03055

From

Kitchens to Heirlooms...

...Leigh Jigs Make Dovetails Easy.



Leigh Super Jigs

SEE VIDEO

leighjigs.com



LEIGH
Celebrating over 30 years

NOVA – The Leaders in Innovation

NOVA has been specializing in Woodturning equipment for over 27 years and were the first to introduce the biggest innovation for woodturners; the 4-jaw self centering chuck, back in 1988. This user friendly design has since been copied and adopted by other chuck manufacturers - precisely because it is so user friendly!

All NOVA Chucks
and Jaws now
backed by a NEW
6-year warranty



novaTM
Smart Tools, Powerful Solutions

Contact your local NOVA Dealer for more information or visit www.teknatool.com

STICKLEY-INSPIRED PLANT STAND

Curved elements give this Arts & Crafts standard a “lift,” but a fumed finish keeps it true to its roots.

By Chris Marshall

The Stickleys strived for function over flair in their designs, but that early 20th century sensibility makes some of their furniture seem imposing and “heavy” by today’s standards, particularly with a dark finish. So, we’re giving the conventional Arts & Crafts plant stand a bit of a facelift here. Instead of straight, wide and thicker cross-pieces, gentle curves and a taller stance make our updated version appear lighter on its feet. And to me, those delicate top rails look like velvet cordons showcasing a favorite plant.

While you can certainly stain this project any “Mission brown” color you like, its compact size makes this project a manageable candidate for traditional ammonia fuming. If you’ve never tried it, there’s no better way to finally know what a fumed finish looks like than to give it a go and see for yourself.

So, now that I’ve planted that seed, let it germinate while I show you how to build this plant stand for your home.

www.woodworkersjournal.com
MORE ON THE WEB



For a video covering the process for ammonia fuming, please visit woodworkersjournal.com and click on “More on the Web” under the Magazine tab.



Riftsawn laminations of white oak form legs with an even grain pattern all around. Only a keen eye will see the glue line. A brad nail driven into the waste ends of each leg can keep slippery glue joints aligned for clamping.

Making the Legs

If you have access to 8/4 quartersawn white oak, you could make these 1½"-square legs from solid blanks. But that will only provide quartersawn grain on two faces, with flatsawn grain on the other two. I think the difference in grain pattern is distracting. Here's an alternative: save that showy flamed quartersawn grain pattern for the aprons and rails, and downplay the grain on the legs. To do that, I glued my leg blanks up from two laminations of 13/16"-thick riftsawn stock (look for end grain that runs about 45° to the board faces). Riftsawn grain has a linear and similar pattern on both its faces and edges. If you make them carefully from the same board, only a woodworker will notice that these laminated legs aren't actually single pieces of wood. It's a really good compromise here.

Once you've ripped and surfaced the legs to final proportions, cut them an inch or so longer than necessary and all to the same length. The tops of the legs will receive pyramids next. In case the pyramid-cutting process produces any tearout, the extra leg length gives you the chance for a "do over" or two, if needed. To set up for cutting the four beveled faces of each pyramid, I screwed a 40"-long fence to my miter gauge and tilted my table saw blade to 19.5°. Draw base lines all around each leg for the pyramids, 5/16" from one end. Now, lightly score along these lines with a sharp utility or marking knife — it helps safeguard against splintering. Clamp a stop block to the miter gauge fence against the flat "foot" end of each leg so the blade lines up exactly with your score lines. Make four cuts to trim the pyramids to shape. If they're crisp and meet your approval, crosscut the legs to final length.

Each leg requires two pairs of 1¼"-long mortises on its inside faces for the aprons and one pair of 1/2"-long mortises for the top rails. Choose the "show" faces of the legs first (arrange the laminated edges of the legs to the sides of the project), and mark the legs to keep their orientation clear. Then lay out these 1/4"-wide mortises, according to the *Drawings* on page 31. Chop all the mortises about 9/16" deep.

I like to chamfer the bottoms of legs like these. It's easy to do with a block plane or a chamfering bit in a trim router, and removing the edges and corners will ensure that the



A stop block and long fence register the legs precisely with the blade for making four beveled crosscuts that create the top pyramid detail.



While the author used a hollow-chisel mortiser to chop the rail and apron mortises in the legs, you could also use a Forstner bit in a drill press, a router and straight bit, or a chisel and mallet. Choose your favorite method.

legs won't chip if the plant stand gets dragged across a floor. Chamfering also adds a nice shadow line detail. About a 1/8" chamfer is all you need. Once the chamfers are cut, sand the legs smooth, then up to 180-grit, and set them aside.



Cut the end shoulders of the rail and apron tenons first. That way, any splintering on the face grain will be removed when you cut the side shoulders next. Here, a top rail blank receives a shoulder cut.



Lower the blade to 1/8" for cutting the broad shoulders on the rails and aprons. These final two cuts bring the tenons to their 1/4" thickness. Make test cuts first, to ensure that the tenons will fit their mortises a bit snug.

Machining the Apron and Rail Tenons

Mill nine, 3"-wide blanks for the aprons from 1/2" stock, and prepare five, 1 3/4"-wide blanks for the top rails (one of each size is a test piece). Crosscut them all to 13" long. While your first inclination might be to start cutting curves into these parts now, save that for last. The right place to begin is by raising tenons on their ends while you still have flat reference edges to bear against. Stack a wide dado blade in your table saw, and



Rout slotted openings in the apron template for guiding the actual mortise cuts, later. These are 3/4" wide and 2 1/2" long. Mark the limits of your router bit's edges on the fence to start and stop these "drop" cuts accurately.

bury it in a sacrificial fence so only 1/2" of the blade projects out from the fence. Start by cutting the "end" shoulders of the tenons, using the test pieces to set up these cuts. Raise the blade to 1/8", install a scrap fence on your miter gauge to back up the cuts, and cut one shoulder on all the parts, with the workpieces standing on-edge. Next, crank up the blade to 1 1/8", flip the workpieces to their opposite long edges, and cut the other end shoulders into all of them. This should produce a 1 3/4"-long tenon on the aprons and 1/2" tenons on the top rails (see top photo, left).

Complete the tenons by lowering the dado blade to 1/8" again and cutting the final two broad shoulders of each one, starting with the test pieces (see center photo, this page). Aim for a good friction fit of the test tenons in their leg mortises. Slightly tight is always better than too loose: you can refine the fit of a snug tenon easily with a shoulder plane or a file.

Shaping and Mortising with Templates

Our eyes can distinguish even subtle differences between two curves, especially when they're parallel and close together — as they will be on these aprons and rails. So, uniformity is reason enough to make templates for shaping both the aprons and rails. You'll also appreciate having stopped slots on the apron template for locating the mortises that house pairs of faux tenons. That way, you can rout these mortises to exact size easily and quickly with a guide collar and a straight bit.

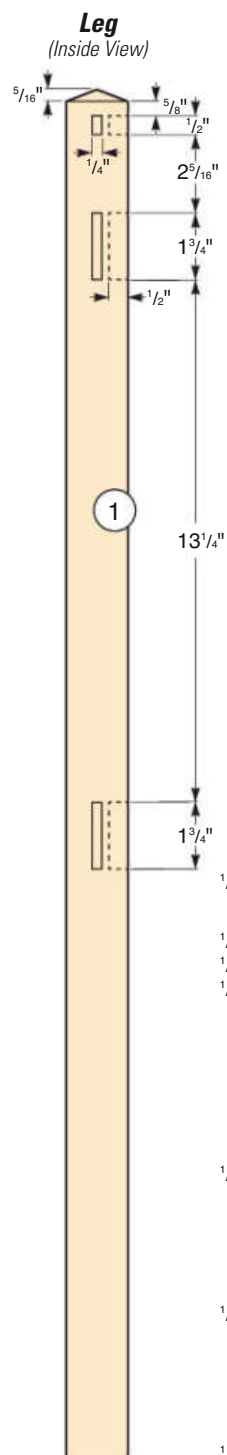
I laid out my apron and rail templates on long strips of 1/2" plywood (see photos, below) so I could leave some extra material at the ends for use as handholds. Bend a flexible batten to draw all the curves, and mark the tenons on the ends of the templates, too. Next, lay out the positions of the mortises on the apron template, then enlarge these two outlines to 3/4" wide and 2 1/2" long. Rout slots through the template to hit your outlines with a 3/4"



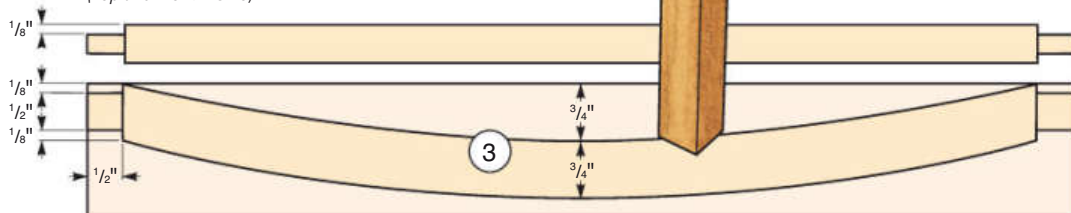
Use the templates to draw curves on the aprons and rails. Rough-cut them about 1/16" outside the layout lines, then tape them beneath the templates. Trim the edges with a piloted flush-trim bit to match the template (inset).

MATERIAL LIST

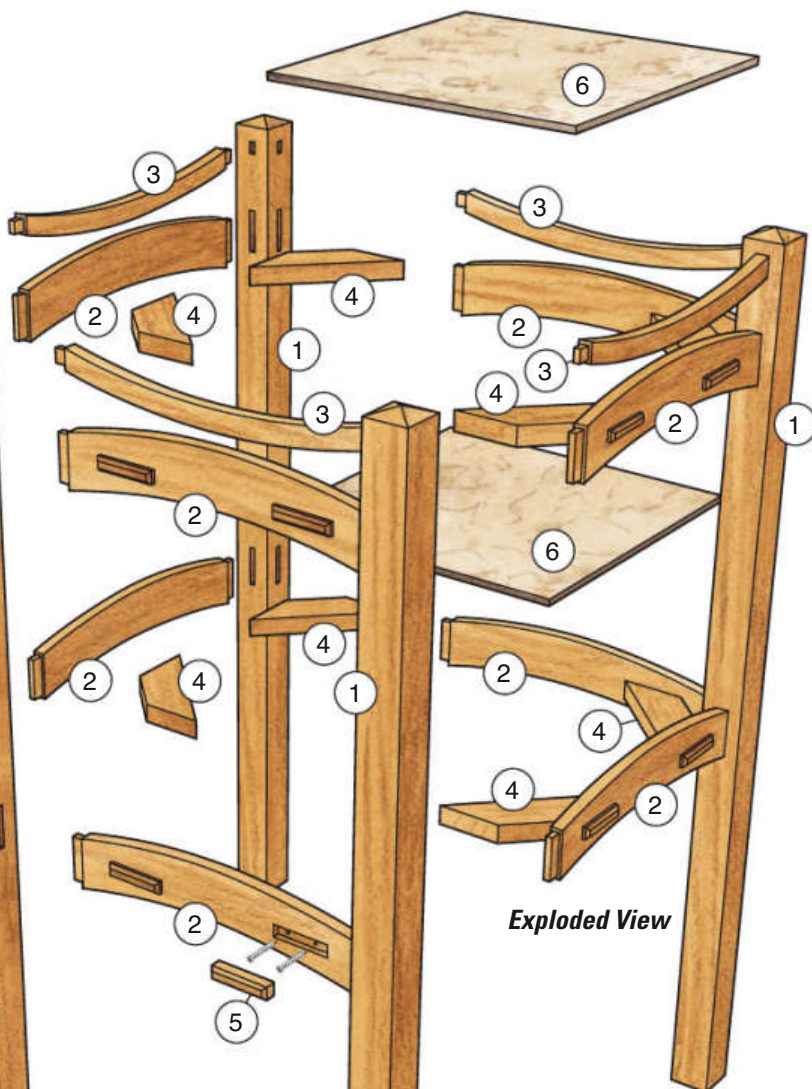
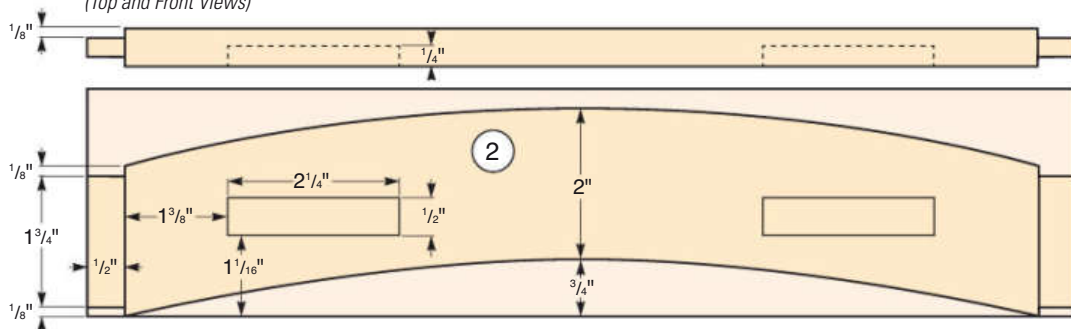
	T x W x L
1 Legs (4)	1 5/8" x 1 5/8" x 36"
2 Aprons (8)	1/2" x 2 1/4" x 13"
3 Top Rails (4)	1/2" x 1 1/2" x 13"
4 Corner Braces (8)	3/4" x 2 1/4" x 6"
5 Faux Tenons (16)	1/2" x 1/2" x 2 1/4"
6 Tiles (2)	1/4" x 12" x 12"



Top Rails
(Top and Front Views)



Aprons
(Top and Front Views)





While an apron is still taped under its template, the author mills two 1/4"-deep stopped mortises with a plunge router, 1/2" O.D. guide collar and 1/4" spiral bit. The offset between the collar and bit creates mortises that are 1/2" wide and 2 1/4" long.

straight bit in your router table, starting and stopping these cuts carefully (see bottom left photo, page 30). Chisel the mortise cutouts square.

Now, grab your jigsaw or head to the band saw to cut the templates to rough shape, and smooth their curves with sanding drums or on a spindle sander. I tacked a pair of 1/2"-thick spacers underneath the handholds of each template to register the aprons and rails automatically, and to add some stability

during use. Once the templates are ready, use them to draw curves on all the apron and rail workpieces. Cut these parts just outside of those layout lines. Then stick an apron or rail to its template with carpet tape, and shave the curves to match the templates with a piloted flush-trim bit in your router table.

After forming the two curves on each apron, I routed its mortises before separating the apron from the template and moving onto the next one. Use a 1/2" O.D. guide collar and a 1/4" straight or spiral bit in a plunge router for this task. Your mortises will end up being 1/2" wide and 2 1/4" long. Rout them 1/4" deep (see top photo at left). Chisel the mortise ends square.

Add some tiny chamfers to the long edges of the rails and aprons, then finish-sand them all to 180-grit.

Assembling the Framework

You're now ready to bring your big stack of parts together into a framework. First, test the fit of all the pieces, then glue and clamp up two side assemblies consisting of two legs, two aprons and a top rail. When those dry, erect the frame with the last four aprons and two rails. Clamp carefully during glue-up so that all four legs stand flat and the frame is square.

Mitered corner braces will support a pair of 12" x 12" floor tiles for the plant shelves. Make the braces by crosscutting eight blanks to 6" long, then miter-cutting their ends to 45°. Measure up from the leg bottoms to set the brace heights from the floor at 17" and 32" (measured to their top faces). Once I had these positions marked, I glued the braces to the aprons with cyanoacrylate for a quick bond. Then I drove pairs of #8 x 1" screws through countersunk holes inside the mortise areas to secure the corner braces permanently.

The last building step is to cover those "secret" screwheads with faux tenons. These tenons look best if you rout or plane



One last detailing step for the rails and mortises: mill 1/16" chamfers along their long, curved edges to give these parts a softer, finished look.



Glue up two side assemblies for the plant stand framework first. When their joints dry, join them to the remaining top rails and aprons to complete the frame. Remember that top rail and apron curves face one another.



A simple way to install these corner braces is with pairs of screws counter-sunk into the stopped mortises. The author held the braces in place with CA glue and a clamp before drilling and driving the screws home.

tiny chamfers around their ends. Just make up a long blank of 1/2"-thick, 2 1/4"-wide tenon stock. Chamfer both ends however you prefer (I used a chamfering bit in the router table), then chop the ends off in 1/2" lengths. Repeat this process seven more times. Glue the 16 tenons into their mortises.

Fuming and Finishing

My "More on the Web" video for this article (see page 28) will provide the details of ammonia fuming, but here's the short story: You'll need a plastic "tent" to cover the plant stand, for trapping the fumes that turn this project from a raw tan color to a grayish or greenish brown. And, it'll take potent, lab-grade ammonia with a 28% concentration to do that job; household ammonia is only about 5% and too weak to fume oak adequately. You can buy a gallon jug of 28% aqueous ammonia from Hi-Valley Chemical (hvchemical.com) for about \$17.

Fuming is a simple process: ammonia reacts with the tannins in the oak to permanently darken it. The longer you leave your project in the tent, the darker it becomes, up to a point. I learned, through a timed test on scraps from the project, that after about 24 hours, darkening slows to a barely noticeable degree. So, after building my tent from furring strips and 4mil sheet plastic, I filled a glass pie plate with 12 ounces of ammonia, dropped the tent in place, and let the fun begin. I changed it at eight-hour intervals and stopped the reaction 24 hours later.



Chamfered faux tenons hide the screw heads and lend a classic Arts & Crafts detail here. CA glue is more than strong enough to secure these parts in their mortises. A spritz of accelerator speeds the glue's cure time.

It is ABSOLUTELY essential to wear a respirator with cartridges approved for ammonia gas, goggles for your eyes, and long sleeves and chemical-safe gloves whenever you handle the liquid. Concentrated ammonia is extremely caustic. But, with proper precautions and good ventilation, I didn't find it problematic to work with.

Once my plant stand came out of the tent, I let it off-gas for two days and then gave it a light final sanding. (Fuming actually penetrates the wood much more deeply than pigment or dye stains will, so touchup sanding won't remove the color.) I wiped the wood down with Watco® Danish Oil Natural, which turned it immediately to a deep chocolate brown. When that dried, several coats of satin lacquer added a pleasant sheen.

After the finish cured, a trip to the home center for some porcelain floor tiles brought this handsome project to a close.

Chris Marshall is senior editor of Woodworker's Journal.

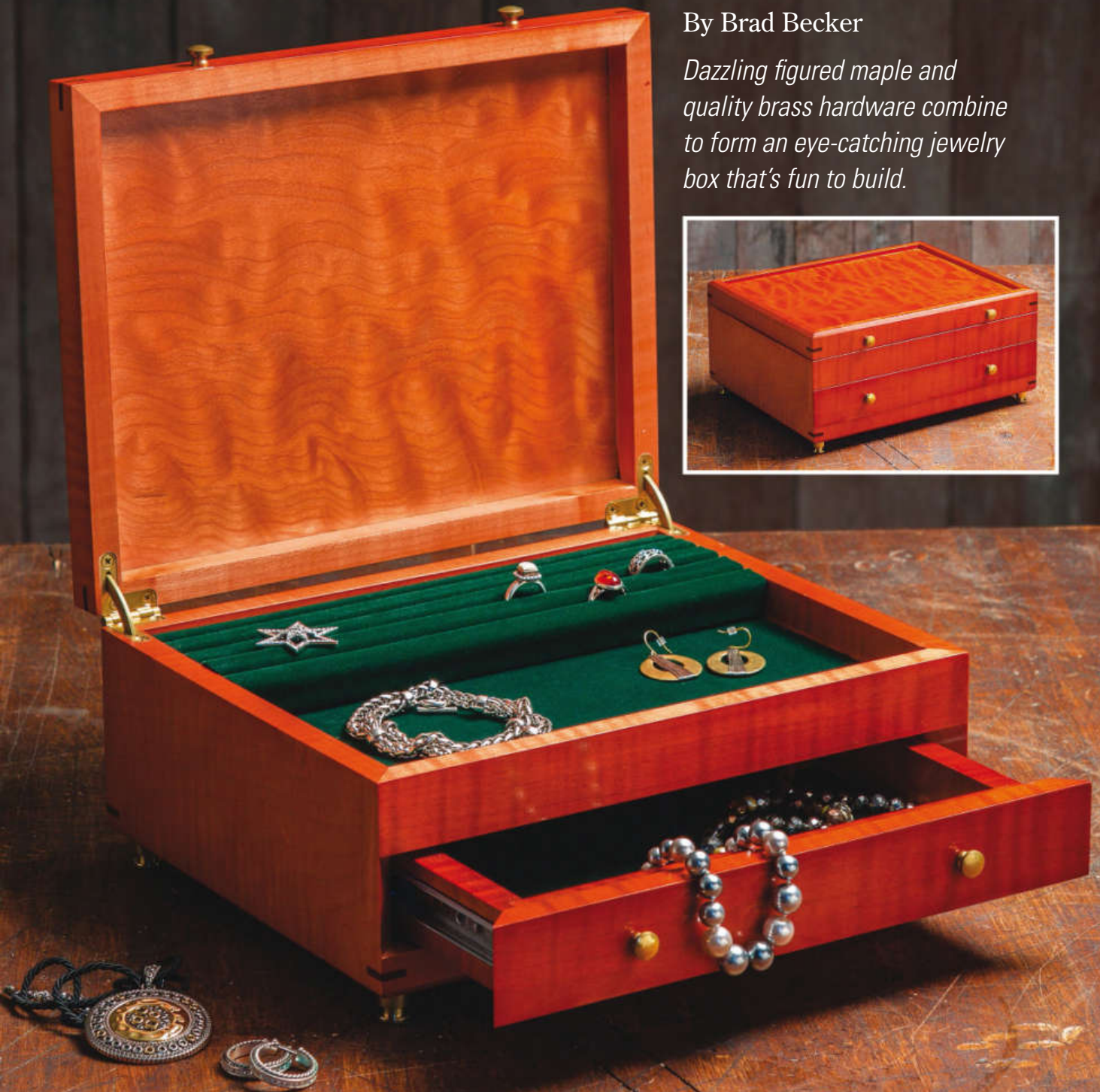
Working with concentrated ammonia requires a cartridge respirator, swim goggles and, when handling the liquid, chemical gloves. Once fumed (right), an oil/varnish blend reveals the oak's new deep-brown color (below).



Classic Mitered Jewelry Box

By Brad Becker

Dazzling figured maple and quality brass hardware combine to form an eye-catching jewelry box that's fun to build.





The outer top and bottom edges of the case pieces have 45° chamfers to dress them up. Make these cuts at the router table with a piloted chamfering bit.



The jewelry box's lid, middle tray and bottom panels fit into three grooves in the case front, back and side workpieces. The author used a straight bit, made for routing undersized-thickness plywood, to rout all of these grooves.

This little mitered jewelry box's details will have you hustling for a long weekend, but the payoff is sweet. When you're done, you'll have a beautiful gift ready for wrapping up this holiday season. I made mine from some nice figured maple, and its dyed finish really makes that grain shimmer! So grab a couple boards of special wood you've had set aside, plus a little 1/4" and 1/8" plywood, and let's get to work.

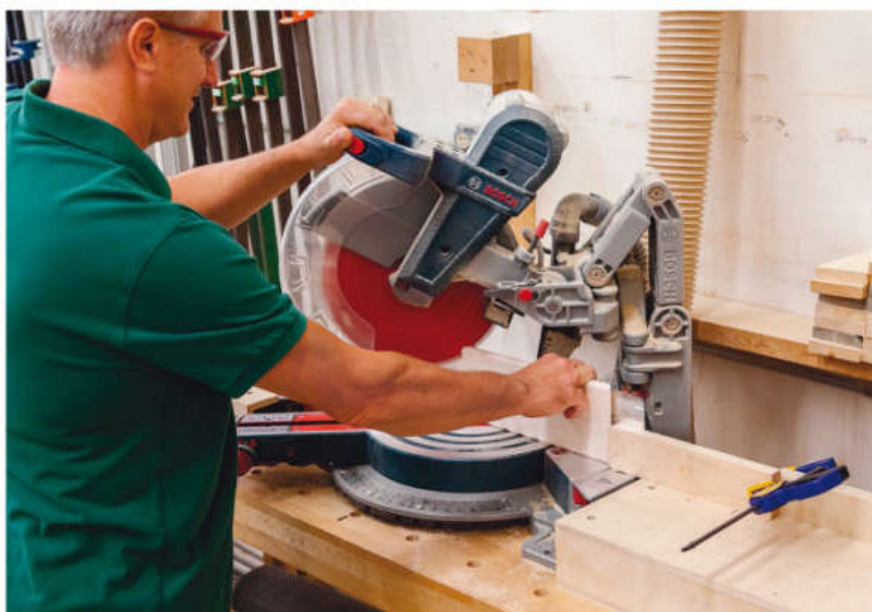
Building the Case

If you're starting with 3/4" solid stock, crosscut a 12"-long piece that's at least 5" wide and with particularly nice figure. Set it aside for a lid panel. Then, rip a 4-ft. length of your stock to 4 7/8" wide, and plane that down to 1/2". Square up one end, and crosscut a piece for the front panel/drawer face to 11" long. Rip what's left of the long board to 4 11/16" wide — it will become the case's two sides and back panel when we cut those parts to length, shortly.

Now why, you're probably asking yourself, is the front panel wider than the other three panels? Well, the drawer face should come from the same front panel so its grain will match the front of the case. And, it takes two 3/32"-wide cuts with a thin-kerf saw blade (3/16" of material loss) to cut that drawer face free. Once we make those cuts a little later, the widths of the remaining strips of the front panel, plus the drawer face, will add up to 4 11/16", to match the width of the sides and the back panel. (Note: If you use a 1/8"-kerf blade instead, make the front piece 4 15/16" wide to start with.)

The top and bottom of the box have some decorative built-in moldings, and we'll mill those next at the router table. With a 45° chamfer bit, first shape the long edges on the prettier "show" face of your front piece and the combined side/back piece (see top inset photo). I set the bit height to 3/16" for these cuts.

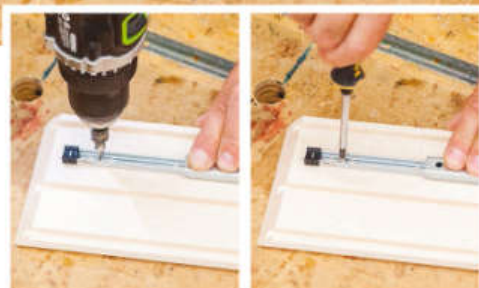
We'll build as much of this box as possible before slicing the lid free, so next come some grooves to house the plywood bottom panel and middle tray, and the top solid wood panel. Since even 1/4" plywood isn't a true 1/4", I used an "undersized" straight bit that cuts grooves to fit my plywood perfectly. Set



Miter-cut the case parts to 45° and to final length. Notice the stop block, clamped in place to the right of the saw, here. It ensures that you'll produce matching parts of exact length when needed.



Two rip cuts with a thin-kerf (3/32") blade turn the front piece into a bottom strip, the drawer face and a wider top strip. The top strip will eventually get ripped again for the lid front.



Position the mini drawer slides on the case sides, centered between the bottom panel and middle tray grooves. Mark their back ends (top). Then drill pilot holes in the side panels (left), and install the slides with 3/8"-long screws (right).



Carry out a full dry-fit of the case pieces before assembling them with glue and strap clamps. Do not glue the solid wood top panel; it should float freely in its grooves to allow for cross-grain wood movement.

MORE ON THE WEB



For a video about cutting and installing corner splines with Rockler's Router Table Spline Jig, please visit woodworkersjournal.com and click on "More on the Web" under the Magazine tab.

the bit height to 1/4". Here's where to place those grooves on the inside faces of both your front and side/back pieces: mill a bottom-panel slot 1/4" from the bottom edge of your parts. Plow the second groove for the middle tray 1 1/8" from the top edge. Then, reset your router table fence one more time to rout the lid panel groove 3/16" from the top edge. Sand the inside faces of the case parts now, up to 220-grit, to get that out of the way.

When the dust clears, head to the miter saw and swivel it to exactly 45° so you can take care of those corner miters. Angle-cut the ends of the front panel, then split the longer piece into

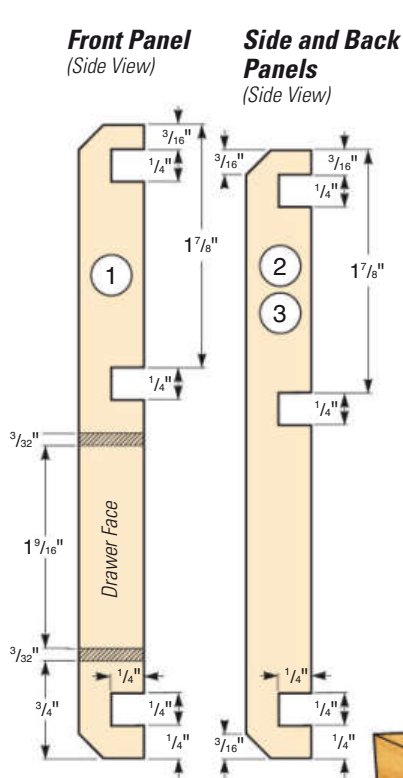
two mitered sides and a back panel: the sides are 8 3/4" long and the back panel is 11" long.

With that done, let's cut the drawer face out now. Set your rip fence 3/4" from the blade, and cut the bottom narrow piece of the front panel off. Then slide the fence 1 1/8" away from the blade, butt the cut edge of the rest of the panel against the fence, and make a second rip cut to separate the drawer face from the front panel's top section. Mark it and the other two loose pieces so you can keep their ordering straight, and set the drawer face aside for a bit.

The side panels, on the other hand, don't need any rip cuts yet, but we do need to mark and install the drawer slides on them while they can still lie flat. Center this hardware between the wider-spaced grooves on the sides (it's the drawer box area), and choose which ends of both side panels will face front on the case. Close the slides, making sure their front edges are flush with the inside corners of the case miters. Mark the backs of the slides and the hole positions for installing 3/8"-long screws. Drill shallow pilot holes for the screws, and fasten the slides to the side panels.

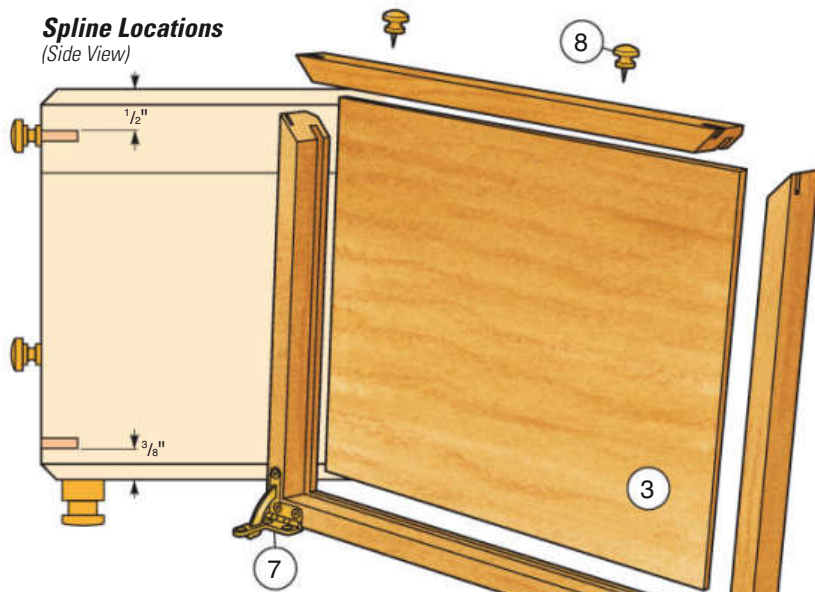
Remember that first piece of stock you set aside for the lid panel? Surface it flat and step over to your band saw to resaw it down the middle. Fold open the pieces, and you've got a beautiful book-matched panel in the making! Glue up this panel, then plane it down to a thickness that just fits into the lid grooves on the case pieces. Then rip and crosscut it, and the plywood bottom and tray panels, to final size, according to the *Material List* on the next page. Finish-sand these three panels.

Enough making parts ... let's put this box together! With the glue bottle still capped, assemble the case parts and panels dry to make sure all the miter joints close tightly. Now, spread a sparing amount of glue into the plywood grooves and over the ends of the miters

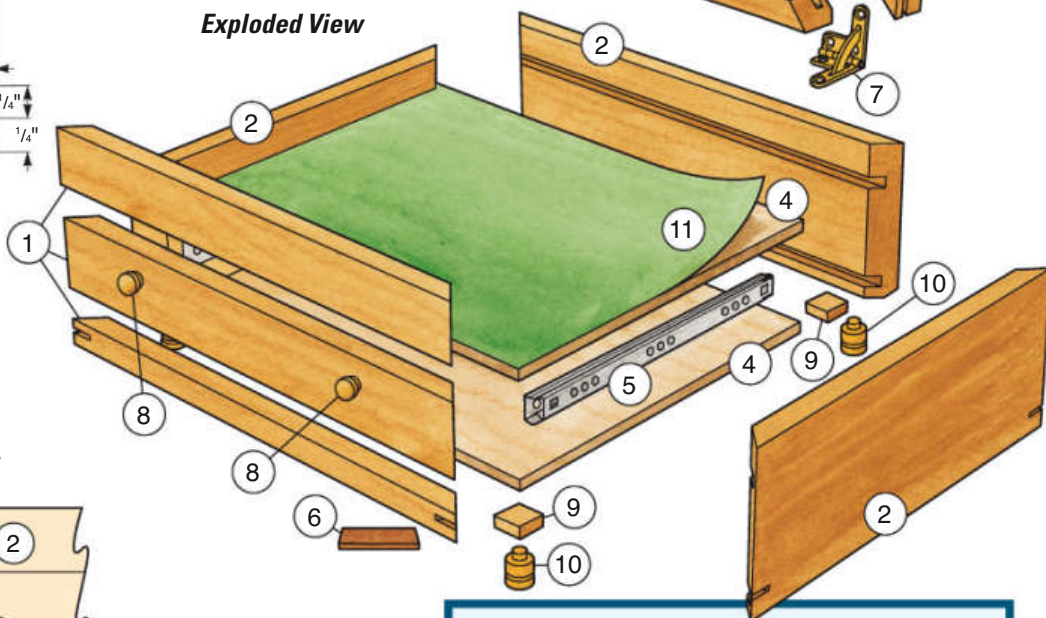


Note: The width of the Front Panel reflects the use of a $\frac{3}{32}"$ blade when removing the drawer front. If you use a blade with a different width, you must alter the piece to reflect the change.

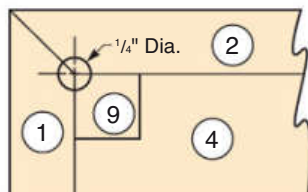
Spline Locations
(Side View)



Exploded View



Foot Hole Locations
(Bottom View)



Jewelry Box Hard-to-Find Supplies

Mini Ball Bearing Drawer Slides (1 pr.) #30804 \$10.99 pr.
Brusso Solid Brass Quadrant Hinges (1 pr.) #11099 \$49.99 pr.
Solid Brass Knobs - $\frac{7}{16}"$ (2 pr.) #27755 \$5.99 pr.
Polished Brass Feet - $\frac{1}{2}"$ Diameter (4) #45523 \$3.49 ea.
Green Self-Adhesive Velvet $12" \times 24"$ (1) #10489 \$14.99 ea.
Green Ring Bar, $\frac{3}{4}"$ W x $24"$ L (1) #39840 \$29.99 ea.
Rockler Router Table Spline Jig (1) #59288 \$79.99 ea.
JIG-IT Hinge Mortising System (1) #58822 \$49.99 ea.

To purchase this and other products online,
 visit www.woodworkersjournal.com/hardware
 Or, call 800-610-0883 (code WJ1577).

MATERIAL LIST (CASE)

	T x W x L
1 Front Panel (1)	$\frac{1}{2}" \times 4\frac{7}{8}" \times 11"$
2 Sides/Back Panel Strip (1)	$\frac{1}{2}" \times 4\frac{1}{16}" \times 37"$
3 Lid Panel (1)	$\frac{1}{4}" \times 8\frac{3}{16}" \times 10\frac{7}{16}"$
4 Inner Tray, Bottom Panel (2)	$\frac{1}{4}" \times 8\frac{3}{4}" \times 10\frac{1}{2}"$
5 Mini Drawer Slides (2)	$7\frac{3}{16}"$
6 Splines (8)	$\frac{1}{8}" \times \frac{3}{4}" \times 1"$
7 Brass Hinges (4)	$\frac{3}{16}" \times 1" \times 1\frac{1}{4}"$
8 Drawer Pulls (4)	$\frac{7}{16}"$ Dia. x $\frac{5}{16}"$
9 Foot Support Blocks (4)	$\frac{1}{4}" \times \frac{1}{2}" \times \frac{1}{2}"$
10 Feet (4)	$\frac{1}{2}"$ Dia. x $\frac{1}{2}"$
11 Green Velvet Lining (3)	Cut to fit

(you can't wipe off any wet squeeze-out that ends up inside the box, after all!). Pull the box together with two or three strap clamps, clean off any wet glue on the outside, and let the assembly dry.

Adding Splines, Subtracting a Lid

Once the strap clamps come off, you have a decision to make: Spline the corners or not? I think splines made from a contrasting wood like walnut really

dress up the mitered joints of this case, but honestly, they're more decorative than structural on a box this small. I used Rockler's new Router Table Spline Jig (item 59288) and a $\frac{1}{8}"$ -dia. straight



Rockler's new Router Table Spline Jig (left) and a 1/8"-dia. straight bit make it easy to cut spline slots across the corners of this case. The author glued walnut splines into the slots (middle) and trimmed them flush (right) when the glue dried.



Four rip cuts with the blade set just shy of 1/2" high cut the lid almost free. A sharp utility knife then finished the job. Doing it this way steadies the lid for better accuracy during sawing.

bit to cut 3/8"-deep spline slots across the corners of the case. I positioned the top splines 1/2" down from the top of the case and 3/8" up from the bottom. I made the splines by ripping a thin strip of walnut and crosscutting it into 1"-long pieces. Glue your splines in place, and trim them flush when the glue dries. Finish-sand the box.

Ready to cut the lid free? It's finally time. Set your table saw's rip fence so the lid will be 1" wide, and raise the blade to just a hint under 1/2". Stand the box against the fence and make four very careful cuts around its perimeter to score the lid almost free. Once the last cut is done, use a utility knife to gently slit through the kerfs and release the lid. Sand the cut edges smooth, and scrape off any dried glue inside that needs to go.

Making the Drawer

At this point, we can take this project almost all the way to the finish line by building the drawer. Here's the good news: the construction is simple. Rip and crosscut the drawer box's front, back and sides to size from 1/2" stock. If you look carefully at the *Drawing* on the next page, the corner joints are just 1/4" x 1/4" rabbets on the ends of the front and back pieces that you can make at your table saw with a dado blade or at the router table with a rabbeting or straight bit. The

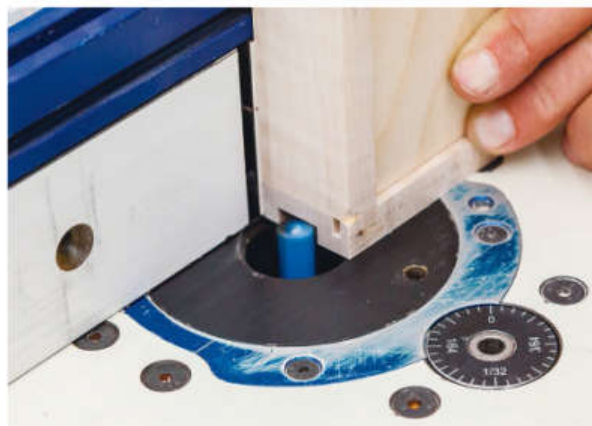
tongues of these rabbets fit into dados cut across the ends of the drawer sides, 1/4" back from the part ends. Those are easy to cut, too. Once these joints slip together it's almost like they don't

need glue. Chuck a 1/8"-dia. straight bit in your router table (or a 1/8"-kerf saw blade in your table saw), because this drawer still needs bottom-panel grooves. For one this tiny, 1/8"-thick plywood will do nicely. You can find it at craft stores.

I placed the grooves 1/8" up from the bottom edges of the drawer parts, and I cut them 1/4" deep. Cut your bottom panel to fit the drawer box, and make sure all five parts go together nicely. Then give them a thorough sanding, and glue the drawer box and bottom panel together.

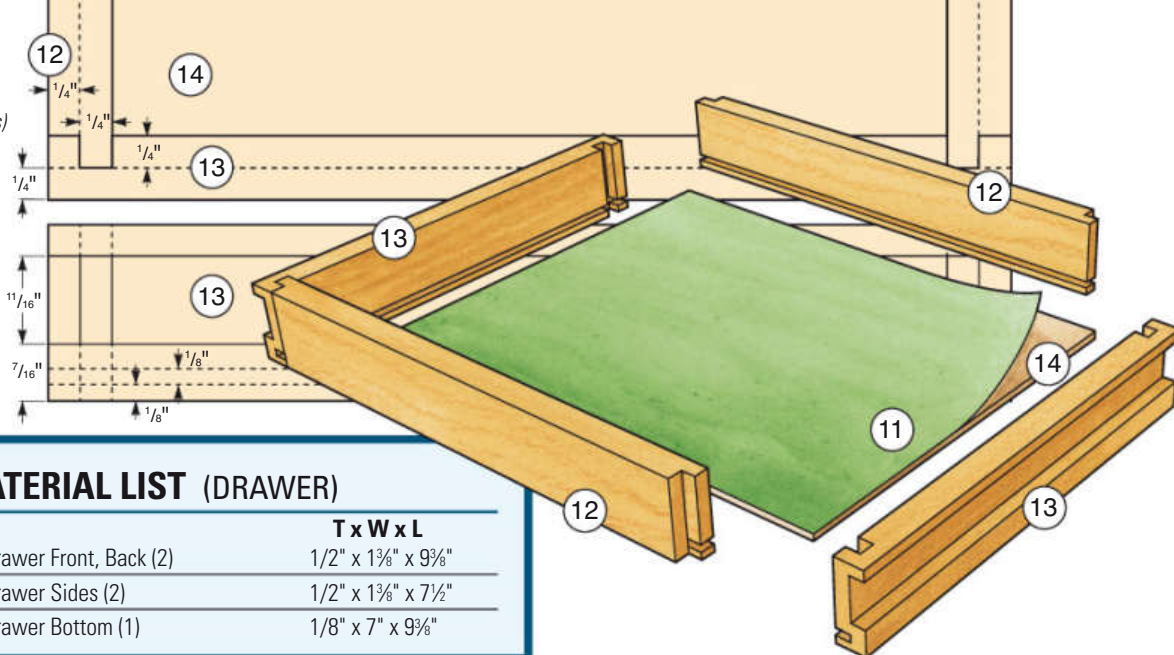
There are still two more big grooves to cut into the outside faces of the drawer box, and those will wrap around the drawer slide hardware, positioning the drawer box in the case. For my project, I was able to cut these grooves 1/4" deep and 11/16" wide (see bottom photo, this page). You could use a dado blade in the table saw, but I chose the router table and a 1/2" straight bit. Two passes, shifting the fence back a nudge after the first, widened my grooves as needed. I also positioned these slots about 1/16" closer to the top of the drawer box than the bottom, rather than centering them perfectly. It left a little more wood near the drawer bottom grooves this way, for added strength.

Now fasten the drawer box to the slides, making sure the front face of the box is flush with the bottom corners of the front miter joints when it's closed. That way,



A wide groove cut into the outside face of each drawer box side hangs the drawer on the slide hardware. Mill these cuts with a straight bit in the router table or at the table saw with a dado blade.

Drawer Detail (Top and Side Views)



MATERIAL LIST (DRAWER)

	T x W x L
12 Drawer Front, Back (2)	1/2" x 1 3/8" x 9 5/8"
13 Drawer Sides (2)	1/2" x 1 3/8" x 7 1/2"
14 Drawer Bottom (1)	1/8" x 7" x 9 5/8"



The author pin-nailed the drawer face to the drawer box front. He positioned these nails right beside the knob locations to hide the pin holes.

the drawer face's miters will fit nicely against the miters on the case.

I sanded the edges and ends of the drawer face lightly so that it fit into its opening with a bit of space on top and bottom. Then I positioned it with the drawer box closed inside the case, and pinned the face and box together with 3/4"-long, 23-gauge pin nails.

Mounting the Lid

With the drawer done, I dyed the lid, box and drawer, then turned my attention to mounting the lid. I went for the "brass ring" of hinges here: Brusso's solid brass quadrant hinges. That's

The mortises for this project's brass lid hinges are much easier to cut with Rockler's new JIG IT Hinge Mortising System. It has a repositionable center plate that indexes all the necessary router cuts.

because Rocker offers a new JIG IT® Hinge Mortising System (item 58822) that makes cutting these complex hinge and lid support mortises much easier. A removeable plastic center plate with several cutouts fits into a base plate and positions the various mortising cuts for a guide collar and straight bit in a plunge router (see below). I routed the mortises and installed the hinges and lid on the case with a few screws to check the action. Then, off came the hinges for final top coating to seal in the dye.

Some Finishing Finery

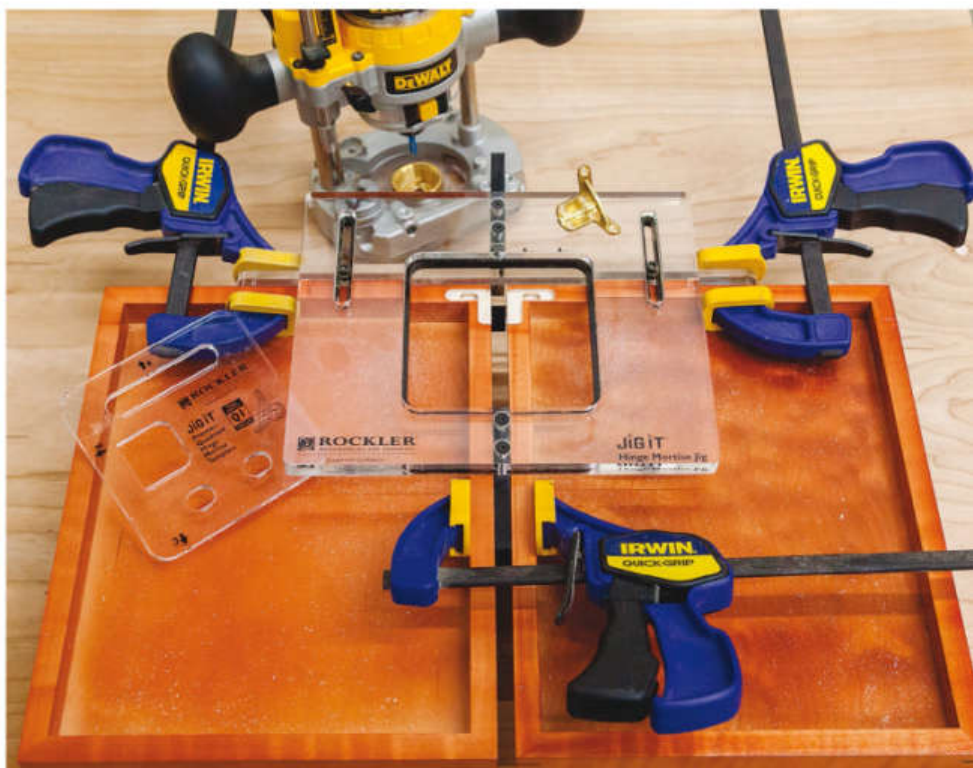
Clear shellac really pops the figure of this maple! But applying it can be

tricky. If you're a novice, try a rattle can of semi-gloss lacquer instead: it's just about foolproof. Then reattach the lid.

From here, I cut 1/4" x 1/2" x 1/2" wood spacers and glued them to the box bottom corners to serve as mounts for four brass feet. I screwed the lid and drawer knobs in place and lined the drawer bottom and top tray with self-adhesive green velvet. A matching green ring bar came last.

My jewelry box is now ready to wrap up as a special gift. I hope yours will meet your holiday deadline, too!

Brad Becker is a professional woodworker and a regular contributor to Woodworker's Journal.



Fancy Keepsake Box

By Bruce Kieffer



"Good things come in small packages," the saying goes. In this case, the small box itself is a good thing (and a great gift).

Few gifts are as well-received as those that are hand-made. Here's a handsome and clever keepsake box with a walnut base, a cherry lid and an ebony handle. There's no latch, hinge or closure holding the lid. Instead, there are hidden magnets embedded in the lid and base and, like magic, the lid "snaps" in place due to magnetic attraction. The design, the varied woods and the leather-covered bottom insert all combine together to create a rich and dramatic piece that's sure to please.

The construction is simple, but making this box requires a high level of precision. I'm amazed by how as projects get smaller, the required attention to detail seems to go up exponentially! It's probably because a small goof stands out like a sore thumb on a small project. You can reduce this effect by making sure your machines are well-tuned, and by taking extra time to finely craft the box or boxes you make.

Making three of these boxes at once is nearly as efficient as making one. And since machining the stock and drilling

the large holes must be done on pieces at least 12" long or longer (for safety reasons), I suggest you make at least three boxes. You can figure it like this: making one box may take three hours, and making three boxes may take four hours. As the quantity goes up, the time per box goes down. This is because so much of your time is spent on machine setups, not the machining itself. If you make more than one box at a time, be sure to label all the parts as you work so bases, lids and handles don't get mixed up.

Magnetic Attraction!

Rare-earth magnets are used to hold the lid to the base. These are small but powerful magnets. I balanced the attraction force by using different thickness magnets set at a certain depth. It took a bit of trial and error, but the setup described and shown here works well.

I oriented the embedded magnets so the lid sits on the base only one way. Doing this eliminates the need to be absolutely

Drill the 1½"-diameter x 1¼"-deep center holes in the base stock. Clamp the workpiece tightly to the drill press table; otherwise, the bit may wander off center.



dead-on perfect in positioning the magnet holes. Here's how it works: Every permanent magnet has both a north and a south pole. Opposite poles attract; like poles repel. For this project, you don't need to know which sides of the magnets are north or south, you just need to know the magnets are oriented one pole up in the left magnet holes, and the same pole oriented down in the right magnet holes. I'll tell you how to set them up in the section on making the lid.

Construction Notes

You'll need the following tools to make the box: table saw, drill press, band saw, and a stationary belt or a disc sander. You'll also need three Forstner bits (a 1½", a 5/16", and a 1/4") and a 5/16" plug cutter, a 1/8" brad point drill bit, and a pair of dowel centers. The diameter of the dowel centers needed depends on the type of dowel centers you use. If your dowel centers are the short type, then you'll use 5/16"-diameter centers inserted in the base's plug holes. If your dowel centers are the long type, then you'll use 1/4"-diameter centers inserted into the base's magnet holes.

Do not use an orbital sander for finish sanding. The parts are too small for that, and doing so will "crown" the flat surfaces, and destroy the crisp edges. Instead, finish-sand the parts using your stationary belt or disc sander with 120-grit sandpaper, then 180-grit, and then 220-grit. Complete the finish sanding using hard and flat sanding blocks with 240-grit sandpaper, and then 320-grit.

Test your machine setups on scrap wood prior to committing the operations to your workpieces. Also, use extra caution: machining small parts means your hands need to get closer to the cutting tools than when you machine larger pieces.

Making the Base

Cut a piece of walnut to 1½" thick x 3" wide x at least 12" long. The base (piece 1), or bases, will be cut from this stock. Draw the base layout (see *Drawing*) on the top of the base piece blank. Using a drill press, drill the 1½"-diameter x 1¼"-deep center hole, or holes if you are making more than one box (see photo, above). Then drill the 5/16"-diameter x 3/32"-deep plug holes, the 1/4"-diameter x 1/8"-deep magnet holes and the 1/8"-diameter bottom hole. That last hole is there so that you can reach in from underneath, using a small diameter tool, and push the bottom insert out, should it ever need to be removed.

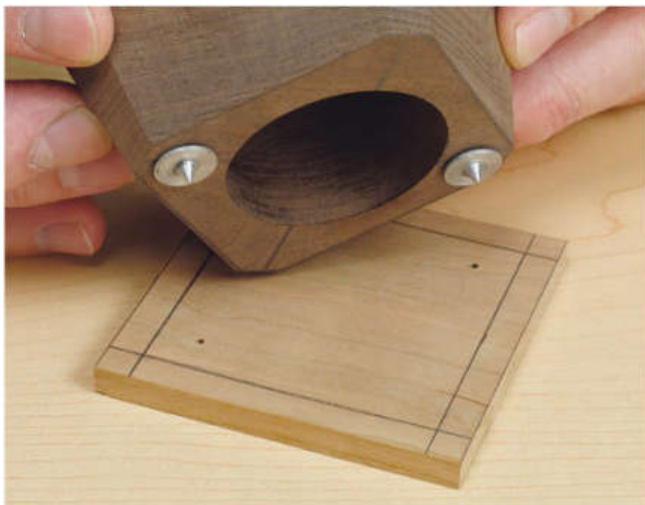
Use a band saw to rough-cut the base shape (left photo, below), and then sand the sides and corners of the base (right photo, below). Sanding with fine grits on a stationary sander will get you extremely close to done, leaving just a bit of hand sanding for later.



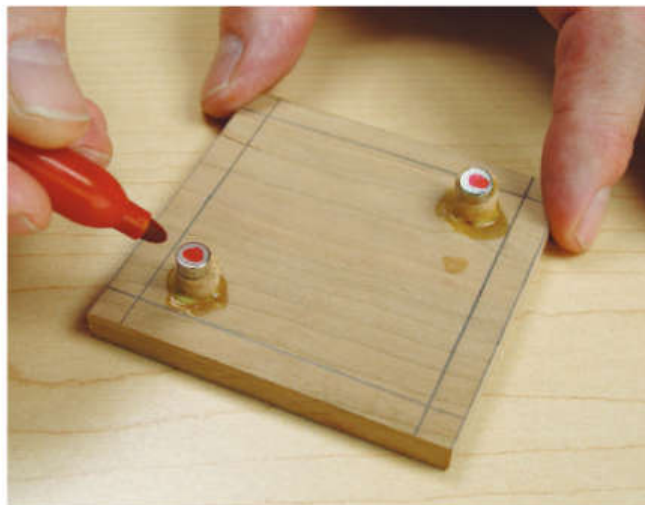
Rough-cut the 14° beveled edges of the base sides. Do the sides first, and then the corners. Be careful: drive the base past the band saw blade with a push stick.



Use a stationary belt or disc sander to define and finish-sand the edges of the base. Start with 120-grit sandpaper, then use 180-grit, and finish with 240-grit sanding block.



Use dowel centers to mark magnet holes on the underside of the lid. Align the base to the lines drawn on the lid, and press down to make the marks.



Determine the base magnets' orientation. Set them on top of the lid plugs, mark the tops, then insert the magnets in the base with the marks down.



Enlarge and trace the shape of the base to the lid. Use a 1/8"-thick spacer to define the desired overhang and shape of the lid.



Join the handle to the lid with 1/8"-diameter dowel pins. They're small, but they do the job. Use the blunted end of a round toothpick to apply glue.

Making the Lid

Cut the lid blank (piece 4) to size. It's initially made oversized so its shape can be traced from the top of the base. Draw a 2 1/4" centered square on the underside of the lid. Insert dowel centers into the plug or magnet holes in the base, and mark the magnet hole locations on the underside of the lid blank (top left photo, above). Drill the 5/16"-diameter x 3/32"-deep plug holes in the lid blank, and then the 1/4"-diameter x 1/16"-deep magnet holes.

Now to determine the lid magnet orientations: Stack the two 1/16"-thick magnets (pieces 5) together; they will grab and join together due to their magnetic attraction. Now you know that the same pole, whether that is north or south, is up. Use a marker to label the "up" side of both magnets. Insert the magnets into their holes in the lid with one mark up, and the other with its mark down and hidden.

Make the lid plugs (pieces 6) using a 5/16"-diameter plug cutter. Glue and gently hammer the plugs in place, covering the lid magnets. Orient and then insert the base magnets (pieces 2) into the base (top right photo, above). With all the magnets oriented correctly, the lid will be attracted to the base one way, and repelled from the base if flipped 180°.



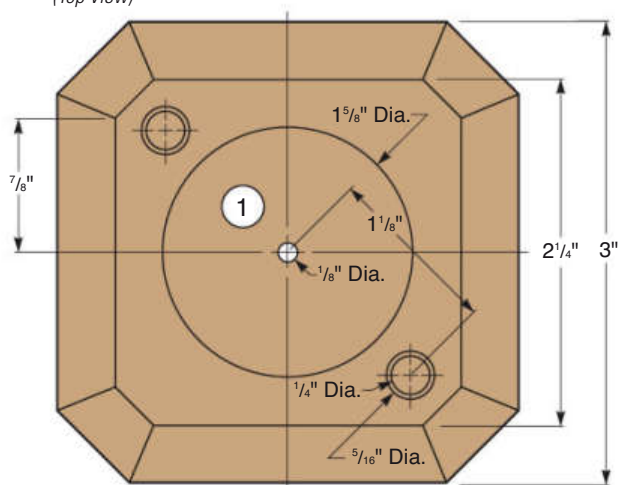
Cover the bottom insert with leather. The leather is adhered to the insert with spray adhesive. Use a utility knife to trim away the excess leather.

Complete the Base and Lid

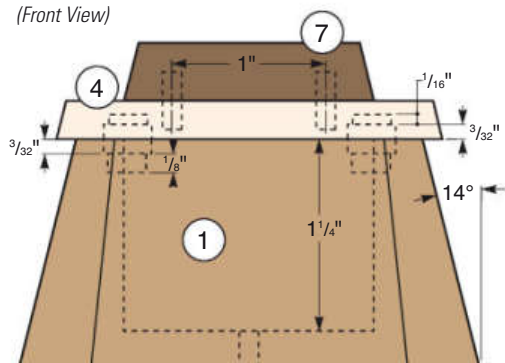
Make and insert the base plugs (pieces 3). Flush-trim the lid and base plugs. Finish-sand the base using hard sanding blocks. Set the base on the lid so the magnets hold the parts together, then lay out the lid shape (bottom left photo, above). Cut and finish-sand the 14° beveled edges of the lid.

Make the handle and dowels (pieces 7 and 8). Drill the handle dowel holes in the handle and lid. Sand the handle and lid, and then glue the handle to the lid (bottom right photo, above).

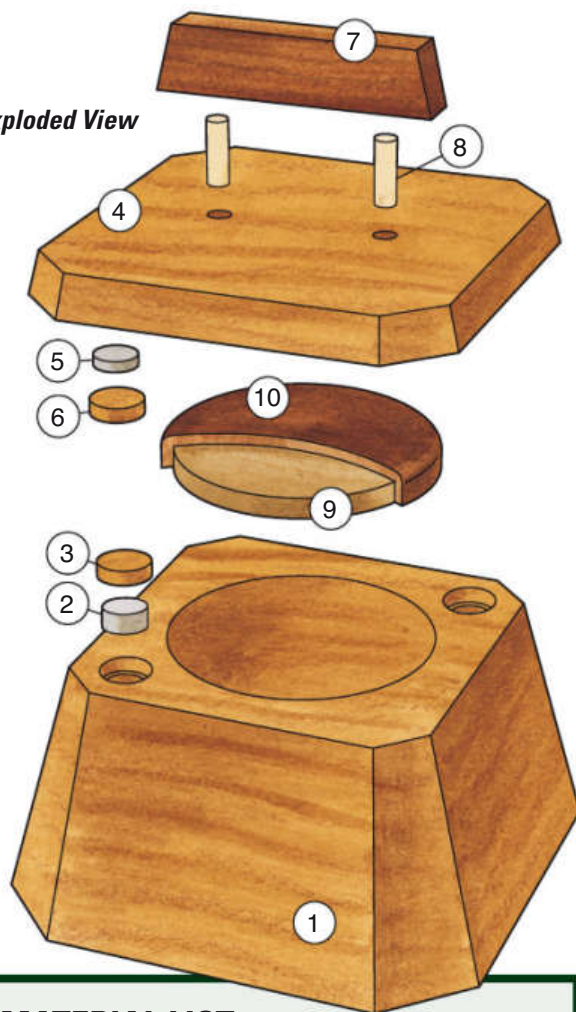
Base
(Top View)



Box
(Front View)



Exploded View



MATERIAL LIST

	T x W x L
1 Base (1)	1 1/2" x 3" x 3"
2 Base Magnets (2)*	1/8" x 1/4" dia.
3 Base Plugs (2)	3/32" x 5/16" dia.
4 Lid Blank (1)	1/4" x 2 3/4" x 2 3/4"
5 Lid Magnets (2)**	1/16" x 1/4" dia.
6 Lid Plugs (2)	3/32" x 5/16" dia.
7 Handle (1)	1/4" x 3/8" x 1 5/8"
8 Handle Dowels (2)	1/8" Dia. x 3/8"
9 Bottom Insert (1)	1/8" x 1 1/8" dia.
10 Leather Cover (1)	2 1/2" dia.

* Item #NSN0579, www.rare-earth-magnets.com

** Item #NSN0657, www.rare-earth-magnets.com

Finishing Up

Use hardboard to make the bottom insert (piece 9), and then cover it with leather (piece 10). The diameter of the bottom insert depends on the thickness of the leather used. Test the fit prior to adhering the leather. The bottom insert with the leather attached should fit slightly snug in the hole.



Apply your favorite finish. The author prefers wax for this project: It's super fast, and it looks great. He uses Scotch-Brite™ pads to buff the dried wax so it's smooth and even.

Apply finish to the wood (left photo), and then insert the leather bottom. Now you're ready to wrap the box, give the gift, see the smiles, and listen to the accolades!

Bruce Kieffer is a woodworking author and technical illustrator. His website is kcfi.biz.

CAROUSEL



This pint-sized carousel recreates the fun and magic of the real thing: A turn of the crank is all it takes to generate smiles.

By Sandor Nagyszalanczy

My favorite ride at an old-fashioned amusement park or carnival midway is the carousel. Riding a rollicking steed as it goes up, down and around is sure to get your blood pumping. So I decided to create a miniature wood carousel that captures some of the colorful fun of the real thing. The finished product features a segmented conical tent top, decorative crown ring, festooned columns and three horses which go up and down as the carousel rotates via a simple hand-cranked friction drive mechanism hidden inside a box-like base. There's even a bell that dings at each rotation! The finished carousel is guaranteed to bring smiles and delight to all who see it. With that said, this presentation piece is not intended to be used by children, both due to the small parts involved and because, as you'll discover, this is a build that requires a lot of patience and precision on your part!

Making the Discs and Turned Parts

A good place to start this project is to make the seven discs/rings and three turned parts needed for the carousel (see the *Material Lists*, pages 46 and 48). To make the larger diameter discs, my favorite method is to cut the discs



To create the larger discs needed to build the carousel, the author rough cuts circular blanks slightly oversized, then uses a shop-made circle jig and a benchtop disc sander to sand them perfectly round and to final size.

to rough size on the band saw, then sand them to their final diameter using a sliding-stop circle jig fitted to the disc sander, as shown above. Smaller discs are more easily turned on the lathe. Once turned to size, the drive wheel gets two 1/16"-deep V grooves formed on its edge (see photo at left, below). These hold a pair of 1 3/4" outer diameter/1 1/2" inner diameter rubber O-rings that provide grip for rotating the carousel. Still on the lathe, turn the tent-topping finial, crank handle and bell dinger from scraps of dowel left over after cutting the carousel's columns and main shaft to length.

Using a ruler and protractor, mark out the location of all holes atop the top

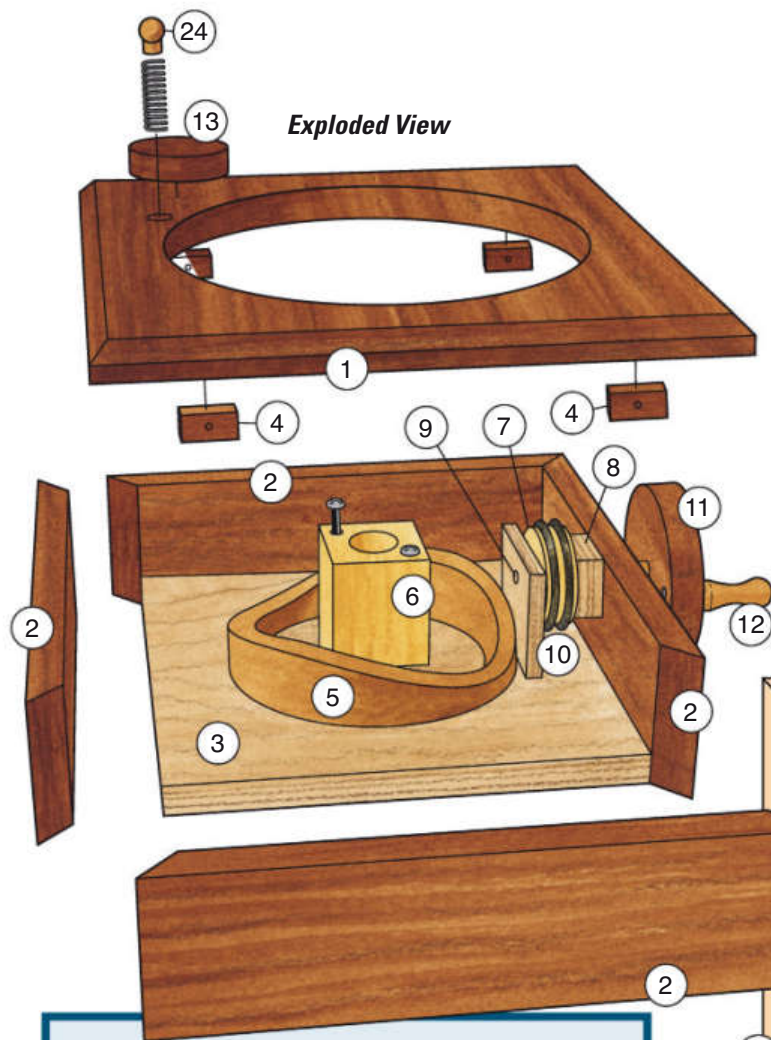
disc as per the *Drawing* on page 48. To assure that the holes in both top and bottom discs are exactly aligned, first bore a 3/4" center hole in both on the drill press, for the carousel's main shaft. Then, stack the two discs and lock them together with a short length of 3/4" dowel. Now bore one of the 1/4" horse rod holes through the discs and press a short length of dowel into this hole. Finish drilling all the 1/4" holes, then switch to a 5/8" Forstner bit and bore the three column holes. After separating the discs, ream out the 1/4" holes with a 9/32" bit. Round over the upper edge of the bottom disc with a 1/8"-radius roundover bit, as well as both edges of the crank wheel.



After turning the carousel's drive wheel to final diameter on the lathe, use a skew or parting tool to cut two shallow channels for a pair of rubber O-rings. These help give the drive wheel enough traction to rotate the carousel.



Holes for the main shaft and three outer columns, as well as for three rods that the horses are mounted to, are drilled in both upper and lower carousel discs at the same time. Clamps and scrap dowels keep the discs in position.



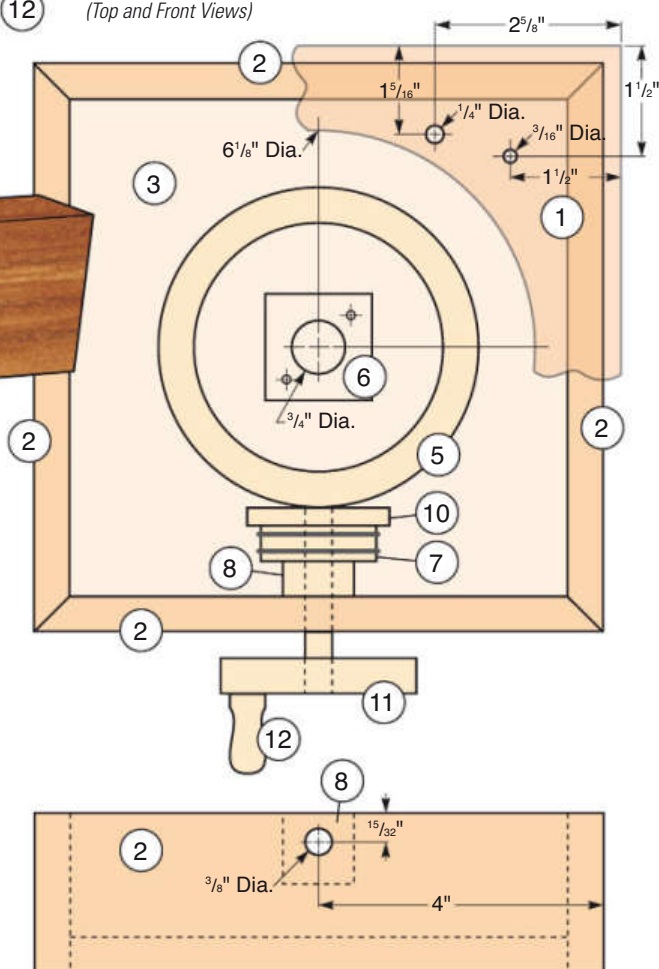
Exploded View

Assorted Hardware:

Shaft Bearing Block Screws: (2) #8 x 2 1/4"
Crank Handle Screw: #6 x 1"
Finial & Tent Top Screws: (4) #6 x 1"
Drive Wheel O-rings: (2) 1 1/4" O.D. x 1 1/2" I.D.
Bicycle Bell: Small Brass
Bell Support Brass Machine Screw: #10 x 2 1/4" (Plus 3 washers, 2 nuts, 1 cap nut)
Bell Dinger Spring: 1/4" O.D., 1 1/2" long
Split Washers: (3) 1/4"

Not intended for use by children.
⚠ CAUTION: Choking hazard/Sharp Edges. Small parts and sharp edges.
Not for children under 8 years of age.

Base
(Top and Front Views)



MATERIAL LIST (Base)

W= walnut, C= cherry, M= maple, P= plywood

	T x W x L
1 Top (1) W	1/2" x 8 1/2" x 8 1/2"
2 Sides (4) W	1/2" x 2 1/4" x 8"
3 Bottom (1) P	1/2" x 7" x 7"
4 Top Cleats (4) W	3/8" x 3/4" x 1"
5 Wavy Ring (1) C	1" x 4 1/2" Dia.
6 Shaft Bearing Block (1) M	1 1/2" x 1 1/2" x 2"
7 Drive Wheel (1) M	1/2" x 1 5/8" Dia.
8 Drive Wheel Spacer (1) P	1/2" x 1" x 1"
9 Drive Shaft (1) M	3/8" Dia. x 2 5/8"
10 Drive Shaft Support (1) P	1/4" x 1 3/4" x 2"
11 Crank Wheel (1) W	1/2" x 2 3/4" Dia.
12 Crank Handle (1) C	1/2" Dia. x 1 1/8"
13 Bell Support Disc (1) W	3/8" x 1 1/2" Dia.

MORE ON THE WEB

For a video showing the carousel in operation and the process for cutting and assembling the tent top wedges, please visit woodworkersjournal.com and click on "More on the Web" under the Magazine tab.

Note: This pattern measures 1" high by 11" long

Wavy Ring Full-size Pattern



To create the six semicircular divots, which adorn the top edge of the crown ring, the narrow ring is clamped to a square block, positioned via markings 60° apart, then sanded using an oscillating spindle sander.



The undulating edge of the wavy ring, which raises and lowers the horse rods as the carousel rotates, is trimmed with an inverted jigsaw following the paper pattern (below) glued around its inside edge, then it's sanded smooth.

Crown Ring and Wavy Ring

To add a bit more circus flair to the carousel, the outer edge of the top disc receives a crown ring that has decorative cutouts around its top edge. The ring seats into a 1/8"-deep, 1/4"-wide rabbet routed into the upper edge of the top disc with a piloted rabbet bit. To make the ring, take the 6½" disc made earlier and mark one side into six equal segments, then remove a 5½"-diameter disc from its center, either using a jigsaw and drum/spindle sander, or a lathe and a parting tool. The goal is to achieve a snug fit between the inside of the ring and the rabbet in the top disc.

The semicircular decorations around the crown ring's top edge are created using an oscillating spindle sander (or drum sander) fitted with a 2"-diameter drum. First, press the ring (bottom side down) into the top disc and scribe a pencil line around the inside of the ring flush with the disc. Remove the ring and use a square to align one of the segment divisions marked earlier perpendicular to the sander's table. Clamp the ring's non-marked side to a large square scrap block. Keeping the block in firm contact with the table, align the perpendicular mark with the spindle/drum and sand away a semicircular hollow as deep as the pencil line (see left photo, above). Repeat this process to create all six semicircles.

To raise and lower the horses as the carousel rotates, the lower end of the horse rods ride atop the undulating edge of a wavy ring. Make this ring by cutting out the center of the 4½"-diameter x 1" thick disc with a jigsaw, thus creating a 1/2"-wide ring. Print out a full-size paper template of the wavy ring from the *Drawing* below, and use spray glue to stick it to the inside of the ring. Using a jigsaw inverted and clamped to a workbench, carefully cut the waste away with a fine-tooth blade. Refine the wavy edge with a sanding drum or oscillating spindle sander, then hand-sand the edge until it's smooth and fluid.

Making the Tent Top

The carousel's cone-shaped tent top is made up of a dozen pie wedge-shaped pieces. (The entire process is shown in the *More on the Web* video.) Start by creating two 16 x 3¾" x 3/8" blank strips from light and dark color woods (I used walnut and maple). On the table saw, tilt the blade to a 37° angle and bevel one long edge of each strip, running the strip vertically past the blade. Cutting the pie wedges is easiest done using two miter gauges, running in the slots on either side of the blade. Screw to



The author used the table saw and a pair of miter gauges fitted with wood fence faces to cut the 12 wedge-shaped pieces needed to make the carousel's tent-like top.

each gauge a temporary wood fence face that extends at least a few inches past the saw's line of cut. Now, using an accurate bevel gauge, set each miter gauge to 77.9° relative to the saw blade. Set the blade's tilt to 9° and its height to 1/2". If your table saw's blade tilts to the left, start by mitering the end of each blank (with its beveled edge against the fence) using the right-hand gauge. Now with the left-hand gauge, set the blank's square face against the fence and cut off a triangular wedge with a base (short side) that's 1½½" long. Once you've cut one wedge from each blank strip, repeat the process five more times. (If your table saw's blade tilts right, first trim blanks with the left-hand gauge, then cut the wedges with the right.)

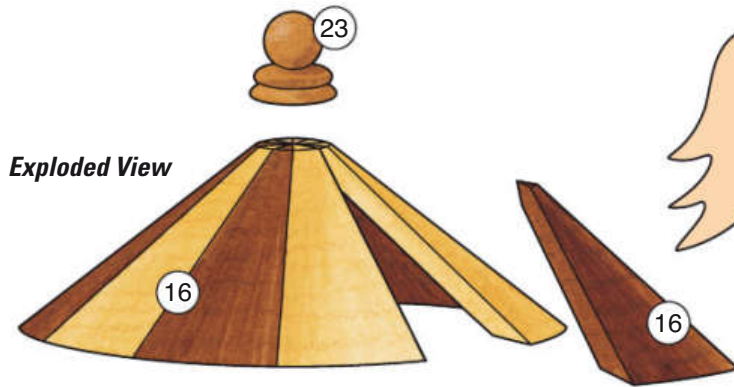
To assemble the wedges into a conical top, set alternating-color wedges face-

down atop strips of masking tape, making sure their bottom corners are flush and edges are butted together tightly. Use a brush to apply glue into each joint, then pull the ends of the assembly

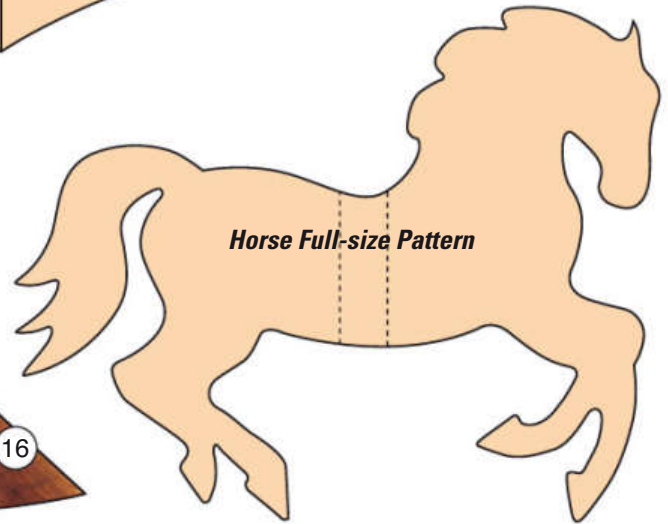
Festoon Full-size Pattern

Festoon Full-size Pattern

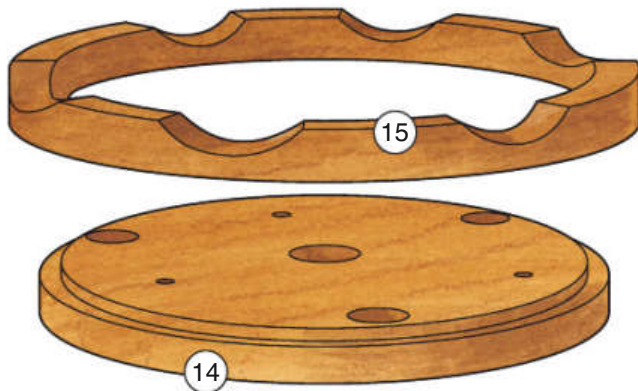
Woodworker's Journal grants permission to readers to photocopy the Full-size Patterns associated with this project, for personal use.



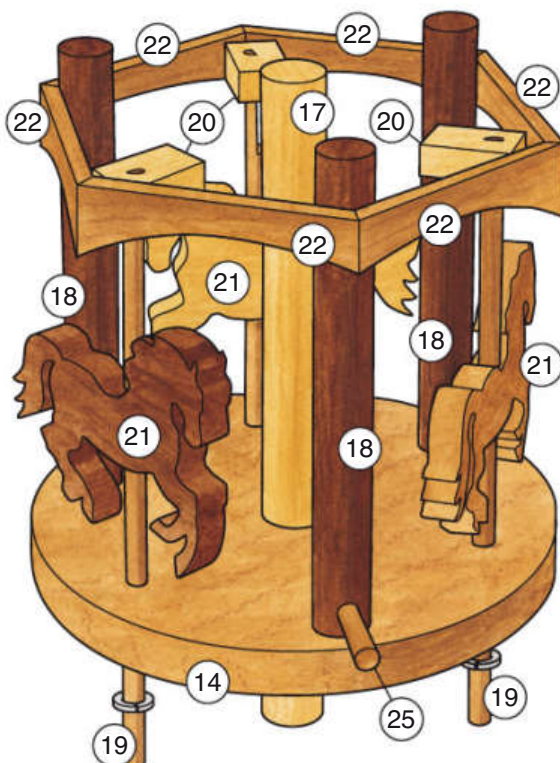
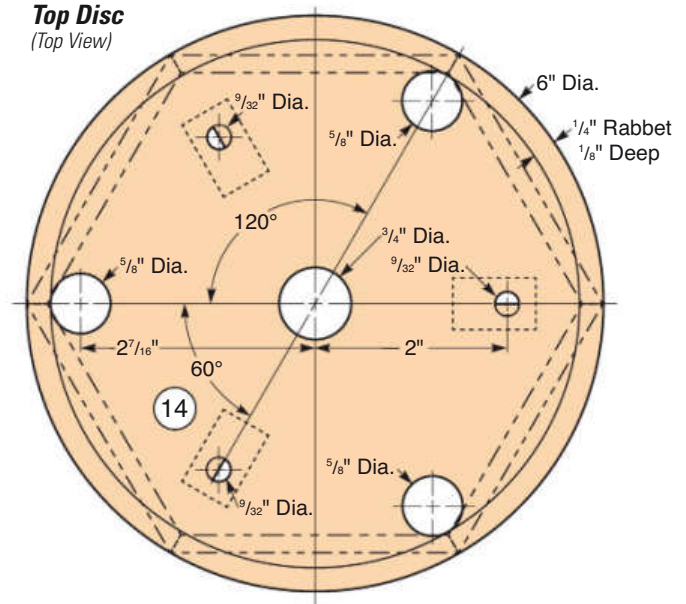
Exploded View



Horse Full-size Pattern



Top Disc
(Top View)



MATERIAL LIST (Carousel)

W= walnut, C= cherry, M= maple, P= plywood

T x W x L

14 Top and Bottom Discs (2) C	1/2" x 6" Dia.
15 Crown Ring (1) C	1/2" x 6 1/2" Dia.
16 Tent Top Wedges (12) W&M	3/8" x 1 15/32" x 3 5/8"
17 Main Shaft (1) M	3/4" Dia. x 8"
18 Outer Columns (3) W	5/8" Dia. x 5 7/8"
19 Horse Rods (3) C	1/4" Dia. x 7 1/8"
20 Horse Rod Blocks (3) M	3/8" x 5/8" x 1"
21 Horses (3) W, C, M	3/8" x 2 3/4" x 3 3/4"
22 Festoons (6) C	3/16" x 1" x 3 1/2"
23 Finial (1) C	7/8" Dia. x 7/8"
24 Bell Dinger (2) C	5/16" Dia. x 1/2"
25 Bell Dinger Dowel (1) C	1/4" Dia. x 1 1/8"



The tent top wedges are taped together, alternating light and dark woods, in preparation for assembly. After brushing glue onto all facing edges, you'll roll up the taped wedges to form the cone-shaped top.



Cut the carousel's three prancing horses from hardwood blanks using a small hand saw, following the outline of the pattern shown on page 48. Copies of the pattern are glued atop each blank with spray adhesive.

together and tape the final joint tight, keeping the base of the assembly flat on the workbench. Carefully check the alignment of the wedges and tweak as necessary. After the glue dries, sand the top smooth. With a small plane or sanding block, flatten the top of the cone to create a circular area $3/4$ " in diameter. Glue on the turned finial and, after the glue sets, secure it from underneath with a #6 x 1" screw.

Fun with Festoons

To make the festoon strips that adorn the underside of the carousel's top, cut out six $3\frac{3}{32}$ " x 1" x $3/16$ " strips and miter the ends, thickness wise, at 60° . Using the template on page 48, cut out and sand smooth the festoon profile on each strip. Lay the strips face-down, tightly end-to-end atop a length of masking tape. Brush glue into each open miter joint, then roll the strips up into a tight hexagon. After sanding off any dried glue, apply glue to the straight edges and clamp the festoons to the underside of the top with the smaller "peaks" around the columns.

Creating the Horses

Each of the carousel's three horses is cut from a $3\frac{3}{4}$ " x $2\frac{3}{4}$ " x $3/8$ " blank, each from a different color wood. After printing out three full-sized versions of the horse outline shown in the *Drawing* on page 48, use spray adhesive to mount them atop the blanks (you may choose to create other animals: cows, elephants, etc.; I made one of mine a unicorn). On the drill press, bore a $1/4$ " hole through each blank, centered on the width of the

stock. Carefully cut out each figure with a scroll saw or small band saw fitted with a narrow ($1/8$ "- or $1/16$ "-wide) saw blade. Sand all sawn edges smooth using jewelers' files and short strips of sandpaper.

To keep the horses from rotating as the carousel spins, the ends of the three $1/4$ " horse rods must be cut into half dowels that will slide in blocks with half-round holes. To keep the rods from turning as they're cut, tape each tightly to the edge of a square piece of $1/4$ " scrap stock. Set your table saw's rip fence to cut exactly half the dowel away. Stop the cut so that only 1" at the end of each rod is trimmed. Round over the untrimmed ends of the rods until they're smooth and blunt. Slide a $1/4$ " split washer onto each dowel and glue it $3/4$ " up from the blunt end and secure with a drop of cyanoacrylate (CA) glue; it serves as a weight to keep the rod in contact with the wavy ring. Now make the three 1" x $5/8$ " x $3/8$ " maple horse rod blocks, first boring a $9/32$ " hole through the center of each. Cut the blocks in half (leaving a half hole) and glue a 1" x $5/16$ " x $3/8$ " maple strip to each cut edge. Glue the blocks onto the underside of the carousel's top disc, carefully centering them on the $9/32$ " horse rod holes.



A short length of half-round dowel helps center the half-round hole blocks (that prevent the horses' rods from turning) as they're glued to the underside of the top disc.



The author uses a set of picture frame clamps to secure the mitered sides of the carousel base to its plywood bottom. A hole in one side is for the crank mechanism's drive shaft.

Base and Drive Mechanism

The base consists of a mitered frame around a $1/2$ " plywood bottom capped with an overhanging top. Start by marking the exact center of the top-facing side of the bottom. Cut 45° miters on the ends of the four side strips. After drilling the $3/8$ " drive crank hole through one side, glue the sides around the bottom.

After cutting the top to final size, rout out a $6\frac{1}{8}$ "-diameter centered hole using



To cut out the hole in the top of the base for the carousel itself, the author uses a small plunge router and a sub-base jig fitted with a pivot pin. The walnut top is temporarily clamped and nailed atop a scrap during routing.



To create a "ding" each time the carousel goes around, a spring with a turned ball on the end is deflected by a short dowel set in the carousel's outer column. When the spring rebounds, it strikes a small bike bell mounted next to it.

a plunge router and 1/4" spiral-fluted straight bit. Since the hole is too small to rout with a standard circle jig, make a sub-base jig for your router from a piece of 1/4" hardboard. Drill a 1/16" pivot hole (for a small nail) through the sub-base exactly 3/16" from the outer edge of the bit, as well as one through the exact center of the top. Set the router's plunge stop so the bit cuts just a hair over 1/2" deep. Place the top on a scrap piece of stock and drive a couple of nails near the pivot hole. Press the pivot pin into the jig and center hole and carefully make the plunge cut a little at

a time (top photo at left). When the bit starts cutting into the scrap, rout only halfway around the circle, then clamp that side to the scrap and complete the rout. To provide clearance for the drive wheel and spacer, rout a 7/16"-deep recess on the under-

side of the top as shown in the photo below, using a 1/2"-diameter cove bit. Finish the top by putting a decorative bevel all the way around its outer edge.

Bell Mechanism

The bell mechanism consists of a small-diameter bicycle bell (removed from its handlebar bell mechanism), a medium-strong 1/4" x 1 1/2" compression

spring with the turned dinger epoxied into one end and a short dowel projecting from the edge of the carousel. When the dowel rotates past the bell (clockwise), it deflects the spring, which then bounces back to strike the bell. First, bore a 1/4" hole for the spring and a 3/16" hole for the screw that secures the bell and support disc to the top of the base, locating both as shown in the *Drawing* on page 46. Attach the bell and disc with a #10 x 2 1/4" machine screw, using nuts and washers to secure them, as shown in the middle photo on this page. Thread the spring into its hole, positioning the dinger ball 1" high (secure it with a drop of cyanoacrylate). Now drill a 1/4" hole for the dinger dowel into

A small screw secures the drive wheel and spacer to the shaft that holds the crank wheel. A little wax rubbed on the end of the main shaft and the edge of the wavy ring keeps things rotating smoothly.

one of the carousel's columns so it'll end up flush with the bottom disc, and glue in the dowel.

Final Assembly

After sanding all parts smooth and applying a nontoxic finish (see *Finishing Thoughts*, page 86), glue the crown ring into the top disc, then glue on the tent top, centering it in the crown ring and securing it with three #6 x 1" screws driven from underneath. Now glue the carousel's columns and main shaft into the top and bottom discs, making sure the main shaft is flush with the top disc and the columns' ends are flush with both discs. Set the horse rods through their holes in the bottom disc, slide on the horses, then position and secure with a few drops of CA glue.

Inside the base, center the wavy ring and glue it in place. Also glue in the drive shaft support, taking care to align its hole square to the shaft hole in the side. After boring a 3/4" hole lengthwise through the center of the main shaft bearing block, carefully center it and screw it to the base with a pair of #8 screws. Sand the end of the shaft until it rotates easily in the block.

To assemble the drive mechanism, first loosely attach the crank handle to the crank wheel with a #6 x 1" screw, then glue the wheel to the 3/8" dowel drive shaft. Glue the wheel spacer to one side of the drive wheel, centering it on the hole. Press the drive shaft through the hole in the base, then through the drive wheel with the spacer facing out, then all the way into the support block. Drill a pilot hole through the spacer and use a #4 x 3/4" screw to secure it to the shaft.

Finally, attach the top to the base using four small cleats glued to the underside of the top on the short-grain sides, then screwed into the sides through oversize holes. For lubrication, rub a little wax on the main shaft and wavy ring, then set the shaft into the bearing block. All that's left is to turn the crank wheel clockwise, and start generating smiles.

Sandor Nagyszalanczy is a contributing editor to Woodworker's Journal.



**WIN ONE OF 4
GREAT FESTOOL PRIZES.**



ENTER NOW!

← SCAN TO ENTER OR
URL TO ENTER: goo.gl/aUDyZr



**McFEELY'S AND FESTOOL
OUR FULL LINE IN STOCK.**

**FESTOOL AND
McFEELY'S.
THE ULTIMATE
POWER COUPLE.**



800-443-7937 mcfelys.com

DO IT ALL WITH A SUPERMAX 19-38

19-38 DRUM SANDER

Engineered for ease-of-use and maximum functionality, the 19-38 can tackle any job in your shop!

MACHINE OVERVIEW

- ♦ Sand 19" in a single pass, 38" in a double pass!
- ♦ Sand as thin as 1/32", as thick as 4"
- ♦ INTELLISAND Technology auto-regulates the conveyor speed, preventing gouging, burning or damaging stock!
- ♦ Power requirements 110 Volt, 20 AMP service



➤ Visit SuperMaxTools.com for full specs and dealer locations.

SuperMaxTools.com
888.454.3401



Looking for Moisture Meters

Lignomat offers
pin and pinless meters

**Avoid
Shrinking
Warping
Cracking
Cupping**

**Buy Quality, Accuracy, Reliability
and Professional Customer Service.**



**2-Year
Warranty!**

??? Check out the new info Web-site
www.moistureproblems.info

lignomat.com 800-227-2105

Seriously Big Collet Chucks



Sized to fit the most popular lathes, with collets that hold 7/8", 1", 1-1/8" & 1-1/4" stock diameters.

Equipped with thrust bearings that make them practically effortless to tighten & release. . .



THE BEALL TOOL CO.

541 Swans Road N.E. Newark Ohio 43055
1-800-331-4718 www.bealltool.com Dpt. WJ

*The Last Coping Saw
You Will Ever Buy*



www.knewconcepts.com

Made in Santa Cruz

Tool Preview

What Can a Laser Do For Me? Full Spectrum H-Series 5th Gen Desktop Laser

by Anatole Burkin

Now accessible to small shops, a laser can etch or cut logos, lettering and patterns, from simple to complex — on wood, acrylic and some metals.



photos by Robin Burkin

Back when I first started woodworking, the big splurge for a small hobby shop (in terms of tools) was a 10" 3hp cabinet saw. Next on my bucket list was a combination jointer/planer, 12" please. Oh, and don't forget a good-sized cyclonic dust collector with a pleated filter.

After a few decades of building furniture and fine-tuning my tool collection, what next? Well, maybe a laser. For the cost of a premium cabinet saw, one can now own a laser engraver/cutter that's suitable for wood and a host of other materials, including acrylics and some metals.

When *Woodworker's Journal* asked me to look at the latest offering from Full Spectrum Laser, the H-Series 5th Gen CO2 Desktop Laser (with removable floor), I confessed that I had no experience with computer-operated woodworking tools. Perfect, they said, we want you to capture the experience of an



The basic kit for the H-Series CO2 Laser Engraver/Cutter comes with the laser machine, water pump, hoses and USB and Ethernet cables.

analog woodworker making his maiden run through the maws of digital crafting.

Setup of the Machine

In general terms, the setup of a laser etcher is similar to that of any complex machine: One must check that key components are still in alignment after shipping, then hook up a few accessories.

The machine comes well-packed, just like a new computer printer, with lots of protective foam. Surprisingly, given the cost, there was no paper manual included. But I had already downloaded it from Full Spectrum's website in anticipation. Plus, the company has a YouTube channel with setup instructions.

The machine is about 20" deep by 30" long by 9" tall. My mobile router table turned out to be an ideal platform.

First order of business requires the attachment of an exhaust blower (an accessory) and hose to vent the fumes. I already had a clothes dryer vent in my garage shop; a simpler

solution is to just hang the hose (clothes dryer ducting) out a window.

The continuous beam CO2 laser generates heat, and its resonance chamber must be kept cool, which is accomplished by a small water pump (included) and distilled water. A five-gallon bucket serves as the reservoir. Hookup is simple: a supply line and a return line.

Last, a small air compressor needs to be attached. Although it's listed as an accessory, air is required for working with wood in order to keep flames from erupting, and it's recommended for other materials as well because it helps the laser cut more quickly. I used

Full Spectrum's small air compressor accessory.

One good suggestion provided by the manual was



Additional accessories required include a fan and air compressor.



The user has to supply a water bucket, distilled water and hose for venting.



Attach the ventilation hoses and fan to remove smoke and fumes from the workshop.

MORE ON THE WEB



For a video showing the author putting the Full Spectrum H-Series 5th Gen CO2 Desktop Laser to use, please visit woodworkersjournal.com and click on "More on the Web" under the Magazine tab.



The laser tube must be kept cool by running distilled water via the submersible pump; a five-gallon bucket makes a handy reservoir.



Attaching the small air compressor improves the cutting action and prevents flare-ups.



To keep the air compressor from rattling around, it's a good idea to screw it to a work surface.

to use a power strip with an On/Off switch for all the electrical components, including the laser. That way, everything starts up at once when powering up, especially the all-important water pump to keep the laser tube from burning up.

All in all, unpacking and hookup of these components took about an hour.

Computer and Software

The next steps are more like getting a new computer printer up and running. The instructions provide a link, user name and password for downloading the RetinaEngrave 3D software. That went just fine.

The first hiccup occurred when I tried to get the computer and laser machine to talk to one another. It took me a while to figure out how to make that happen. Turns out I had to type the IP address showing on the laser display into a form within the RetinaEngrave program.

Just when I thought I was ready to test fire, I hit another snag: a message saying that the laser wasn't "homed." I read and reread the Quick Start instructions, to no avail, and finally went online to chat with tech support at Laser Engineering. The person said to just press the "house" icon within the program interface. Duh! To my partial defense, this little bit of info was missing from the Quick Start instructions (although mentioned quickly in the vid-

eo and deep down in the software manual). But support was immediately available and right on the money.

Checking Alignment

Although I was itching to burn something, the instructions called for more inspections: The laser tube must be test fired, then three mirror alignments must be checked.

Here's where the instructions are a step behind the packaging. To cut to the chase, go online and look at the company's YouTube channel (www.youtube.com/user/FullSpectrumLasers), which helps make sense of the written instructions. The first check is to place one of the self-stick labels (they look like small shipping labels) that came with the machine over Mirror No. 1, then test fire. Lucky me: The laser tube was A-OK.

Next, one is instructed to continue the mirror alignment checks using the same label paper. Again, everything checked out.

Should mirror alignment be required, the manual covers it, and the job could be time-consuming as it involves a bit of trial-and-error.

Last, the laser focus lens must be adjusted to the cutting surface. That takes only seconds: A spacer block is placed between the material to be etched (which rests on a honeycomb plate) and the laser focus lens. A thumbscrew allows movement of the lens, so that it comes to rest on top

of the spacer block. This operation needs to be repeated whenever there's a change in material thickness.

Create or Import Files

I'm not a graphic artist and didn't own any drawing software, so I downloaded Inkscape, a free graphics program, and spent a few hours learning the basics. It seems to be a pretty powerful program and allows one to draw, use text and import ready-made images for processing. The laser is also compatible with Microsoft® Word, MS Paint,



Run the water pump and look for bubbles in the laser tube; tip the machine to disperse the bubbles.

CorelDRAW®, Adobe Illustra-
tor and other programs.

Etch and Cut Wood

Making an engraving or cut, once everything is set up, is as simple as clicking the "Print" prompt in the software being used and choosing the laser from the menu. Doing so automatically opens

the current project in the RetinaEngrave software, where additional adjustments can be made. The machine has both a Raster mode, used for engraving, and a Vector mode, used for cutting. There's also a design tab, but I preferred using Inkscape.

Continues on page 56 ...

"Wow! You made a Bolt Action Pen?"



Bolt action handle smoothly advances and retracts the refill!

Patented

The World's First Bolt Action Pen Kit.

Discover the joy of making this irresistibly fun Bolt Action pen, a gift that will be hard for any hunting or target-shooting enthusiast to put down. Every detail, from the one of a kind bolt-action mechanism to the precision-engineered components, was carefully designed to ensure uniqueness and reliability. So easy to make on a lathe, no one will believe you made something of this quality in 15 minutes. **Call or go online for a FREE Pen Making DVD!**

		1-4	5-24	25-49
Chrome	#PKCP8010	\$12.95	\$12.05	\$11.15
Gun Metal	#PKCP8020	\$12.95	\$12.05	\$11.15
24kt Gold	#PKCP8000	\$14.95	\$13.95	\$12.95
Black Enamel	#PKCP8030	\$13.95	\$13.05	\$12.15
Antique Brass NEW	#PKCP8040	\$14.95	\$13.95	\$12.95

Penn State Industries
Top Quality, Great Prices and Expert Advice!

1-800-377-7297 • www.pennstateind.com

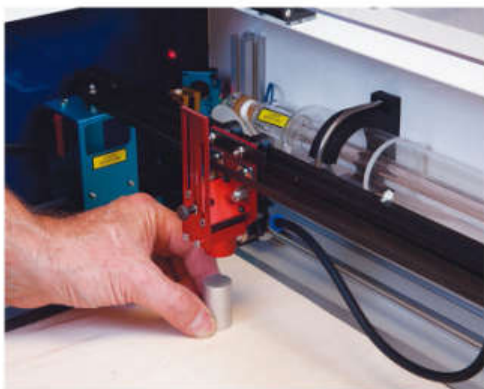


3 Bolt Action Pen Kit Starter Package

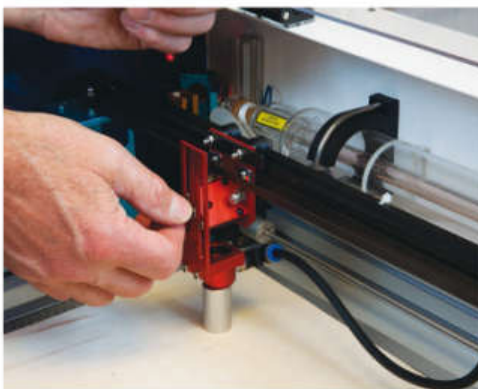
You get one of each pen in 24kt Gold, Chrome and Gun Metal, plus the drill bit and 2pc Bushing Set

#PKCPBAPAK **SAVE \$8 Only \$42.75 SAVE 16%**

Tool Preview continued



To focus the laser, place the spacer between the patent-pending focus head and the workpiece.



Loosen the thumbscrew and set the focus head atop the spacer, then remove the spacer.

My first burn was a simple monogram I created with the calligraphy pen in Inkscape, and to my surprise, it came out pretty good.

The etching process for a small job, say an inch or two in diameter, takes only a few minutes. But upsize that graphic to say, something

like 12" by 12", and the job might take about an hour, depending on the complexity. An important safety note: Don't leave the laser running unattended.

Although none of my projects went up in flames, there is a steady stream of smoke, and one of the duct-taped vent hoses did get loose, filling my shop up with smoke. Better to use hose clamps.

Next, I experimented with graphics acquired online. I saved them as SVG formats and resized them using Inkscape. I found printing from Inkscape (which transfers the work to RetinaEngrave) worked better than dragging and dropping a file directly into RetinaEngrave, which would sometimes cause the program to freeze up.

While etching takes a moderate amount of time, cutting wood requires more time. Full Spectrum offers two more powerful laser tubes as options that would speed up the process considerably and allow for cutting up to 1/2"-thick material. With the supplied 40-watt laser, it took half a dozen or more passes to cut 1/4"-thick plywood.

Cutting produces even more smoke than etching, but the supplied blower was up to the task. That said, the smell of smoke around the perimeter of my home was pretty obvious. Placing the hose vent higher, such as an eave or rooftop location, would help dissipate the fumes better.

Working from Photos

I didn't have a lot of time with this machine, but I was determined to create something original. I thought

a panel (such as for a box top or door panel) engraved with an original photo would be an example of how the tool could be used best. So I clipped a leaf off a healthy fern and photographed it as best I could. In short, make sure the image is in sharp focus, with a white background and well lit. I would also add, for starters: keep the image simple.

Next, process the image in a photo processing program and convert it to a black-and-white or grayscale image, and crank up the contrast. Once I imported the image into RetinaEngrave, I chose the halftone function, set the laser for lower power and slower speed (better for detail) and let it rip. Twenty minutes later, my first photo effort was done.

There's a lot of information provided by the company and its users on the Laser Spectrum forum that explains how to get the best results for etching or cutting using different materials. I'm still a total rookie at this, but I was able to get good results on my first try.

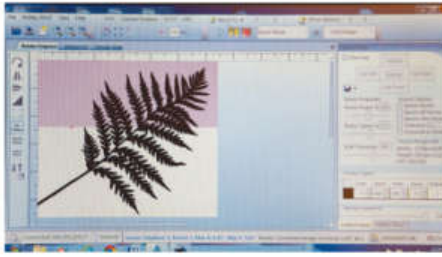
The H-series 5th Gen C02 Desktop Laser (with removable floor), plus fan and compressor accessories valued at \$350, is available in a bundle package for \$3,849.99 at Rockler (rockler.com, item 55598), the first retailer to offer this consumer-priced laser. The laser will handle 12" by 20" materials inside



Test the laser beam on a piece of paper, then repeat to check the alignment of the three mirrors.



Once you've loaded a project, the laser goes to work. Be sure not to bump the machine during the burn as the workpiece is not clamped in place.



The RetinaEngrave software shows the progress of the job.



To create original etchings from photos, shoot your photo prop against a white background.

the unit, but the removable bottom (about 16 screws) allows the machine to be placed on any large, flat surface, which really opens up creative possibilities for components like tabletops, case sides and doors. A rotary accessory is available for working on cylinders, like pens or bottles. The computer requirements are an Intel® Core™ or AMD Athlon™ II processor with Microsoft Windows® 7 64-bit with Service Pack 1 and 6GB of RAM.

An Ethernet connection is best, but a USB cable will also work.

Make no mistake about it: This is one complex tool. Over time, parts may need adjustment and laser tubes (\$300 for the 40 watt model) will have to be replaced. Fortunately, the troubleshooting section of the manual is quite in depth. Because there's both hardware and software to deal with, the tool is more like a CNC machine than an old-fashioned

analog woodworking tool. A comfort level with learning new software is a plus. But it didn't take me a whole lot of time to get satisfying results, and I had a lot of fun stretching my horizons.

Anatole Burkin, former editor and publisher of *Fine Woodworking*, is a freelance journalist and woodworker in northern California.



The laser engraver/cutter allows you to add a variety of designs to your work.

ROCKLER®
 WOODWORKING AND HARDWARE
 Create with Confidence™

The most complete catalog for woodworkers

- Featuring over 10,000 items
- Innovative jigs and tools
- Router accessories
- Rare hardwood
- Turning supplies

Get your **FREE** catalog today
 at www.rcklr.co/660 or
 call **1-800-279-4441** (Code 660).

Mortise & Tenon Joints?

No problem.

Three easy steps to routing perfectly fitting joints

SEE VIDEO

leighjigs.com

800-663-8932

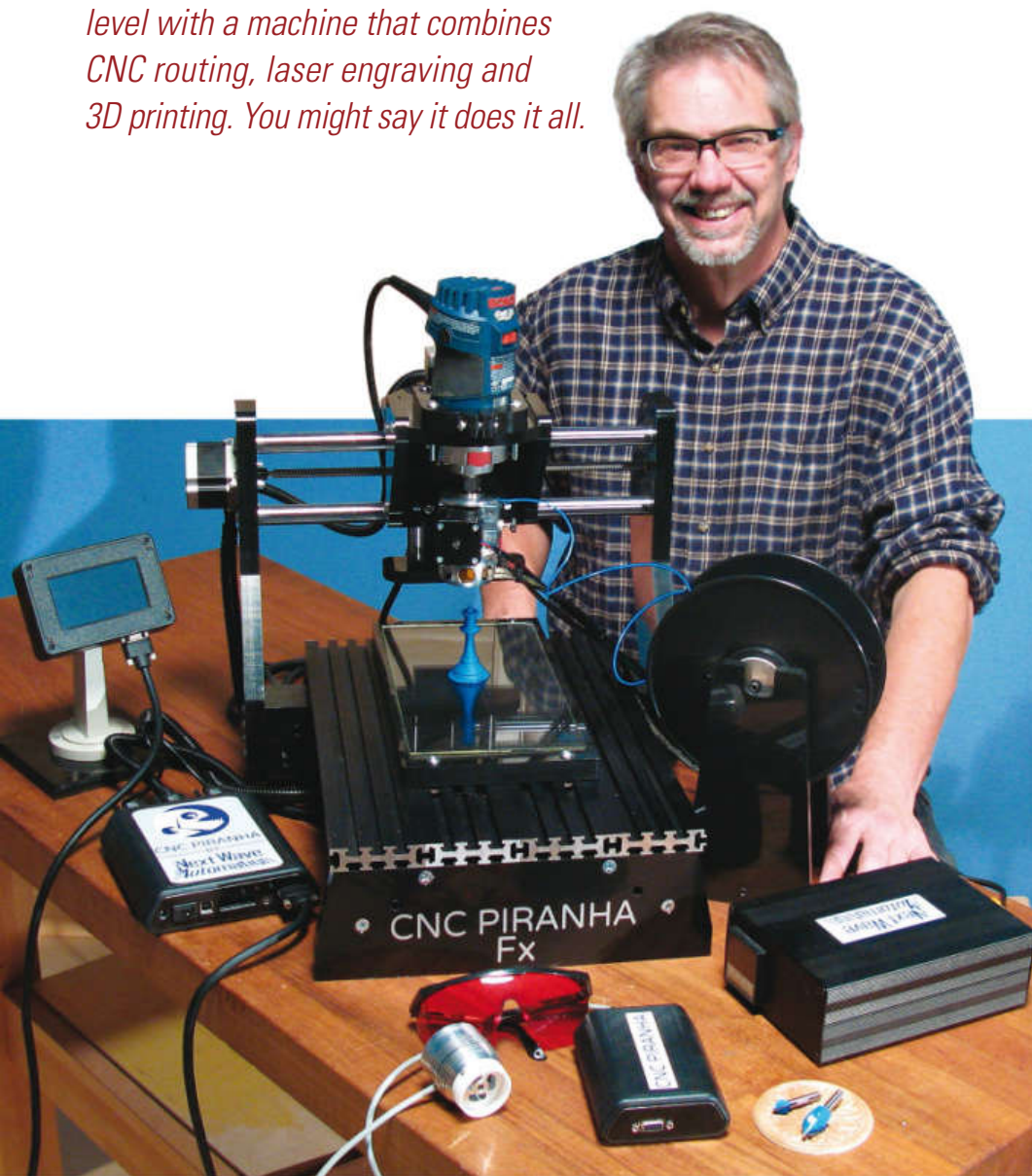
LEIGH MORTISE & TENON JIGS

Tool Preview

A Three-in-one Machine: the Piranha FX

by Rob Johnstone

The Piranha FX takes new technology to the next level with a machine that combines CNC routing, laser engraving and 3D printing. You might say it does it all.



Of course, you can still make the finest furniture, from rough stock to final finish, using classic hand tools — and many folks love doing just that. But most of us use some combination of modern power tools and old-school standbys.

CNC Routers: Old-school?

CNC (computer numerically controlled) routing has been around a while now, and it has even been in home woodworking shops for nearly a decade. There is no doubt in my mind that it is here to stay.

If an old dog like me can learn a couple of new CNC tricks, imagine what the next generation of shop rats will do with it. My 3½-year-old granddaughter is already learning programming (before she can read). High school woodshops that still exist all have CNC technology of one sort or another. The CNC ship has sailed into the future, taking us woodworkers with it.

CNC: Not Just for Routers

Some time ago, Steve Krohmer, vice president of merchandising and product development at Rockler Woodworking and Hardware, told me that the first company to take a CNC router and join it together with a laser

New technology has been entering the woodshop since the first chisel was put into a chunk of wood to form a hand plane. In fact, it's pretty great to live in the 21st century: The high-speed steel table saw blades of my youth can't

hold a candle to the amazing carbide-tipped wonders I use today. Flesh-detecting technology is making woodshops safer using electrons as our friends. And I have used the CNC Shark from Next Wave Automation a good bit in my own shop.

Continues on page 60 ...



Wood + You = KNIFE

NEW! KITS EXCLUSIVE TO ROCKLER



Folding Fillet Knife Kit #54576

- 5 7/8" Blade
- 7 1/8" Closed
- 13" Overall
- Satin Finish
- 440 Stainless Steel
- Liner Lock

Includes:

- 440 Stainless Steel Blade
- Stainless Steel Pins
- Heavy Duty Nylon Carrying Case



Two Piece Carving Set Kit #54415

- 440 Stainless Steel Tools
- Mirror Polish
- 7 1/2" Carving Knife & 7 1/4" Carving Fork
- Black Presentation Box



- Includes:
- 2 Stainless Steel Tools
 - Pins
 - 4 Stainless Steel Inserts

Bird Knife Kit

#55325

- 2 1/2" Blade
- 6" Overall
- Mirror Polished Finish
- 440C Stainless Steel
- Lock Back

- Includes:
- 440C Stainless Steel Blade
 - Pins
 - Washers
 - Leather Sheath



Available at a Rockler store near you or visit rockler.com

SARGE
KNIVES



800-472-6950

What can we help you make today?

WOODLINE
Quality Carbide Router Bits,
Shaper Cutters & More



Also a distributor of

CMT ORANGE TOOLS

Amana Tool
REDEFINING WOODWORKING™



Visit our **NEW** and **IMPROVED** website for our expanded selection of CNC bits and other specialty tools.

Request or view
a catalog online or visit us at
www.woodline.com

Free shipping on orders over \$50.

There's still time to create some stunning holiday gifts. Our bowl & tray bits & more than 60 styles of templates will have you making gifts that will surely be appreciated.

Made in
 USA



Visit our website
and we'll show you
how easy it is.

You **CAN** make this clock
with your router! Deluxe
kits including pin router,
templates, bit, wood and
instructions **ONLY \$249**

Made in
 USA



Use the pin router to duplicate
the provided patterns.



Wood kits are now
available in 8 species.



Tool Preview continued



Traditional CNC router

3D printer module

Laser engraver module

The CNC Piranha FX, winner of the 2015 AWFS Visionary New Product Award, is a high-tech multi-machine for small shops.

engraver and a 3D printer would have a world-beating product. I agreed but thought that it would be a long time coming. Once again, my predictive powers have proved to be puny — because that is just what Next Wave Automation has done with its Piranha FX. Tim Owens, the owner of Next Wave, unveiled the Piranha FX at last summer's AWFS® Fair, where it won a Visionary New Product Award.

Piranha FX: CNC Plus

The FX takes the basic Piranha and adds a laser engraver module and 3D printer module. You can purchase the whole setup together, or just one component at a time. The basic Piranha machine has been on the market for a while now. The FX is built on that frame, but it has some upgraded firmware, which is the software that provides control, monitoring and data manipulation. (If you already own a Piranha, the upgrade is available.)

Since it is a CNC router, the Piranha can rout, cut and engrave just like any quality CNC machine will do. It can work in wood, aluminum, other “soft” metals and plastics — it is a full-fledged CNC machine in a small package. The table of the machine is 12" by 18". It comes with all the software you need, including VCarve 8.0, which runs on the PC platform. (It is not yet compatible with Mac operating systems.) The Piranha works with a

palm-sized router that you purchase separately. The Bosch Colt or the DeWALT DWP611 are two models that work well with the machine and have the power to do the cutting expected of them.

My experience with the CNC Shark, which uses the same operating system as the Piranha, is that it is easy to use. Some things like making signs or engraving images are as simple as using a printer with your computer — something most of us do every day without a second thought. You can put your routing job on a thumb drive,



As a classic CNC router, the Piranha FX is able to machine complex patterns and shapes easily and repeat them exactly.



In its CNC router configuration, the FX can make use of one of several late-model palm routers.

take it into your shop and then load it onto the Piranha machine. That keeps your computer out of the sawdust in your shop. (And believe me, you can make a lot of sawdust with a CNC router!)

Continues on page 62 ...

Paw Prints™

Jantz introduces our new line of Paw Prints™ Mosaic Pins™. The perfect pin to compliment any hunting knife or a special project for the dog lover in your life.

Also available in 3 3/4" lengths.



Paw Prints™ Mosaic Pins™ on Tan G10 with scrimshaw design. Custom knife designed and built by Jose Gpe. Ruiz Garcia, Mexico.



3/16" x 12"
#MP380
\$22.95



1/4" x 12"
#MP455
\$44.95



1/4" x 12"
#MP480
\$44.95

1/8" Diameter x 12" Length



#MP810
\$14.95



#MP860
\$18.95



#MP880
\$18.95

5/32" Diameter x 12" Length



#MP510
\$22.95



#MP520
\$22.95



#MP530
\$22.95

3/16" Diameter x 12" Length



#MP300
\$22.95



#MP310
\$22.95



#MP340
\$29.95

7/32" Diameter x 12" Length



#MP700
\$39.95



#MP730
\$39.95



#MP785
\$39.95

1/4" Diameter x 12" Length



#MP405
\$44.95



#MP410
\$44.95



#MP440
\$44.95

JANTZ

SEE OUR
COMPLETE LINE AT
knifemaking.com
1-800-351-8900

BE A BETTER CRAFTSMAN WITH THE NEW P650LX SUPER PINNER



- Drive up to 2" 23 gauge headless pins into hardwoods
- Most powerful pinner
- Runs well on lower powered mini compressors
- Nose-contact safety
- 10 pin reserve tank with one-touch access



FIND YOUR DEALER

888-447-3926 647-236-3626

www.grextools.com

MAKE MONEY WITH YOUR WOODSHOP



MAKE
\$500
A DAY

- 19-year proven program
 - A+ Rank with the BBB
- Visit our website for more information

1800bunkbed.com/wj

1800BunkBed
It's Your Business™

STOP BUYING LUMBER

Saw and produce lumber on site



G5558 Mini Mill
\$126



G777 Small Log Mill
\$170

www.granberg.com
Call for a Free Catalog 800-233-6499

Laser Engraving

Lasers are nothing new in the workshop. Lasers to locate a cut on your chop saw or the drilling point on your drill press are common and handy. On jobsites, laser levels are speeding up work all over the country, and there are even consumer models,

Laser engravers can etch logos, words, pictures, patterns and even super-exact mark-out lines for machining later.



like those from RYOBI, you can buy for under 20 bucks.

But when it comes to laser engraving, actually etching a picture or design onto a surface, that is a completely different can of worms. Until now, a machine that would do that sort of laser engraving would cost several thousand dollars at least, but the laser module for the Piranha FX is selling for only about \$900! That is not chump change, but it is far less than the nearest option on the market. (Rockler is now selling the Full Spectrum H-Series CO2 Laser, the most cost-effective dedicated laser machine, priced at \$3,849.99.)

The Piranha FX laser module's power rating is just under three watts. (For comparison, the Full Spectrum Laser is more than 10 times stronger.) For that

reason, it is most effective in an engraving role rather than in a cutting operation. With that said, the FX can be used to cut through paper and cardboard and even thin veneer. Personally, I am quite interested in using it for making veneer inlay pieces for the electric guitar kits I put together. It will make customizing them just that much easier.

The FX can take an image file and "print" the picture into wood, leather or other surfaces by firing the laser at different intensities to create the etched image. As with anything you do, it may take a few attempts to get exactly the look you want, but it is not a difficult process to master.

For example, if you take the same piece of birch plywood and etch the surface without a finish, and then do it with, say, a coat of shellac or lacquer, you will get two different results. You decide which you prefer or works best for the job you are doing. By the same token, applying a finish after you have etched an unfinished piece of wood will give you yet another variation.

When you use the Piranha FX as a standard CNC router, you need a palm-sized router. When you're using the FX as a laser, that same router acts as a convenient way to accurately mount the laser module, which fits into the router's chuck. (The router is not powered up when you're using the laser.)

Looking directly at some lasers can be harmful to your eyes. Although the FX laser module is not dangerous if used correctly according to the manufacturer, protective goggles are provided with the unit.



Next Wave's economic approach to laser engraving, putting it within reach of us average Joes and Josephines, provides a wonderful opportunity to move into this highly creative means of enhancing our woodworking.

3D Printing

On *Star Trek's* starship Enterprise, a machine could make, on voice command, just about anything from a cup of coffee to a complicated tool or a very groovy weapon. While our 3D printers today haven't yet moved to the level of sophistication seen by Captain Jean-Luc Picard, they are still pretty amazing.

3D printers work by extruding molten (melted) plastic from a small nozzle. It lays down layer upon layer of the plastic, which hardens in place. The form is created by precise movements of the nozzle that are controlled by the computer program. It is almost an exact opposite exercise to CNC carving. There, the CNC router is removing material; here, it is building it up. Plastic is the most common material used in 3D printing, and that is also the case with the Piranha FX. (Other options used in some 3D printers have included ceramics, metal, wood and even chocolate!)

Like the laser module, the FX's 3D module mounts into the router's chuck. There is a spool of plastic that feeds the printer. It can make something three inches tall while



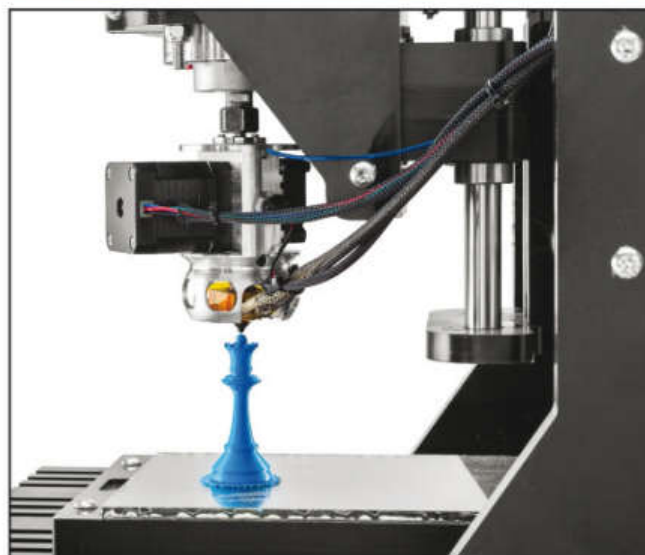
Printing in 3D is one of the most innovative new CNC-based processes. This affordable home shop module is just out from Next Wave Automation.

printing on a special plate that you put on top of the standard Piranha aluminum deck. Software is provided to power the 3D printing process. It nicely provides everything you need to get started in 3D printing.

Conclusion

The CNC Piranha FX is a very nice system. It delivers on its promise to bring CNC routing, laser engraving and 3D printing into the small shop at an accessible price, all with one machine — which is a huge innovation. With that said, the Piranha FX has its limits. It is not a large machine, so it is limited by dimension. The laser is not extremely powerful, so it cannot cut through heavy material. And the printer is not going to produce products that you could get from a \$20,000 3D printer.

But, at a price around \$3,500 (on rockler.com), I double-dog dare you to get anything that comes close to its capabilities.



The 3D printing nozzle can create intricate individual objects like this chess queen from layers of molten plastic.

And, within its constraints, it is a groundbreaking system that is highly functional. Next Wave has really done a great job with the Piranha FX, and I can hardly wait to make one part of my shop and see what an oldster like me can make it do. And when I think of the next generation of makers putting it to use, I'm sure we can expect some great stuff.

Rob Johnstone is the publisher of Woodworker's Journal.

HARBOR FREIGHT

QUALITY TOOLS AT RIDICULOUSLY LOW PRICES

QUALITY TOOLS

SUPER COUPON

**ALUMINUM OXIDE
SANDING SPONGES
PACK OF 10**

YOUR CHOICE!
\$3.99
REG. PRICE \$5.99

SAVE 33%

COARSE
LOT 46751

MEDIUM
LOT 46752

FINE
LOT 46753

35150439

LIMIT 6 - Good at our stores or HarborFreight.com or by calling 800-423-2567. Cannot be used with other discount or coupon or prior purchases after 30 days from original purchase with original receipt. Offer good while supplies last. Non-transferable. Original coupon must be presented. Valid through 2/26/16. Limit one coupon per customer per day.

SUPER COUPON

**4" x 36" BELT/
6" DISC SANDER**

SAVE \$80

\$59.99
REG. PRICE \$139.99

35126426

LIMIT 4 - Good at our stores or HarborFreight.com or by calling 800-423-2567. Cannot be used with other discount or coupon or prior purchases after 30 days from original purchase with original receipt. Offer good while supplies last. Non-transferable. Original coupon must be presented. Valid through 2/26/16. Limit one coupon per customer per day.

SUPER COUPON

72" x 80" MOVER'S BLANKET

SAVE 66%

\$5.99
REG. PRICE \$17.99

35159000

LIMIT 4 - Good at our stores or HarborFreight.com or by calling 800-423-2567. Cannot be used with other discount or coupon or prior purchases after 30 days from original purchase with original receipt. Offer good while supplies last. Non-transferable. Original coupon must be presented. Valid through 2/26/16. Limit one coupon per customer per day.

SUPER COUPON

26", 16 DRAWER ROLLER CABINET

SAVE \$330

\$319.99
REG. PRICE \$649.99

35153288

LIMIT 3 - Good at our stores or HarborFreight.com or by calling 800-423-2567. Cannot be used with other discount or coupon or prior purchases after 30 days from original purchase with original receipt. Offer good while supplies last. Non-transferable. Original coupon must be presented. Valid through 2/26/16. Limit one coupon per customer per day.

SUPER COUPON

1/4" TRIM ROUTER

SAVE 63%

\$19.99
REG. PRICE \$54.99

35169018

LIMIT 6 - Good at our stores or HarborFreight.com or by calling 800-423-2567. Cannot be used with other discount or coupon or prior purchases after 30 days from original purchase with original receipt. Offer good while supplies last. Non-transferable. Original coupon must be presented. Valid through 2/26/16. Limit one coupon per customer per day.

SUPER COUPON

20% OFF

ANY SINGLE ITEM

35119005

LIMIT 1 - Save 20% on any one item purchased at our stores or HarborFreight.com or by calling 800-423-2567. *Cannot be used with other discount, coupon, gift cards, Inside Track Club membership, extended service plans or on any of the following: compressors, generators, tool storage or carts, welders, floor jacks, towable Ride-On Trencher, Saw Mill (Item 61712/62366/67138), Predator Gas Power Items, open box items, in-store event or parking lot sale items. Not valid on prior purchases after 30 days from original purchase date with original receipt. Non-transferable. Original coupon must be presented. Valid through 2/26/16. Limit one coupon per customer per day.

WOW SUPER COUPON

2.5 HP, 21 GALLON, 125 PSI VERTICAL AIR COMPRESSOR

SAVE \$70

\$149.99
REG. PRICE \$219.99

35101312

LIMIT 4 - Good at our stores or HarborFreight.com or by calling 800-423-2567. Cannot be used with other discount or coupon or prior purchases after 30 days from original purchase with original receipt. Offer good while supplies last. Non-transferable. Original coupon must be presented. Valid through 2/26/16. Limit one coupon per customer per day.

WOW SUPER COUPON

12" x 33-3/8" WOOD LATHE WITH REVERSIBLE HEAD

SAVE \$120

\$229.99
REG. PRICE \$349.99

35109375

LIMIT 3 - Good at our stores or HarborFreight.com or by calling 800-423-2567. Cannot be used with other discount or coupon or prior purchases after 30 days from original purchase with original receipt. Offer good while supplies last. Non-transferable. Original coupon must be presented. Valid through 2/26/16. Limit one coupon per customer per day.

SUPER COUPON

40 FT. RETRACTABLE CORD REEL WITH TRIPLE TAP

SAVE \$30

\$69.99
REG. PRICE \$99.99

35151871

LIMIT 5 - Good at our stores or HarborFreight.com or by calling 800-423-2567. Cannot be used with other discount or coupon or prior purchases after 30 days from original purchase with original receipt. Offer good while supplies last. Non-transferable. Original coupon must be presented. Valid through 2/26/16. Limit one coupon per customer per day.

SUPER COUPON

1.5 HP ELECTRIC POLE SAW

SAVE \$30

\$69.99
REG. PRICE \$99.99

35138912

LIMIT 3 - Good at our stores or HarborFreight.com or by calling 800-423-2567. Cannot be used with other discount or coupon or prior purchases after 30 days from original purchase with original receipt. Offer good while supplies last. Non-transferable. Original coupon must be presented. Valid through 2/26/16. Limit one coupon per customer per day.

How Does Harbor Freight Sell GREAT QUALITY Tools at the LOWEST Prices?

We have invested millions of dollars in our own state-of-the-art quality test labs and millions more in our factories, so our tools will go toe-to-toe with the top professional brands. And we can sell them for a fraction of the price because we cut out the middle man and pass the savings on to you. It's just that simple! Come visit one of our 600 Stores Nationwide.

WOW SUPER COUPON

26", 4 DRAWER TOOL CART

WINNER - Truckin' Magazine

SAVE \$180

\$99.99
REG. PRICE \$279.99

35123704

LIMIT 5 - Good at our stores or HarborFreight.com or by calling 800-423-2567. Cannot be used with other discount or coupon or prior purchases after 30 days from original purchase with original receipt. Offer good while supplies last. Non-transferable. Original coupon must be presented. Valid through 2/26/16. Limit one coupon per customer per day.

SUPER COUPON

MECHANIC'S GLOVES

SAVE 60%

\$3.99
REG. PRICE \$9.99

35135348

LIMIT 9 - Good at our stores or HarborFreight.com or by calling 800-423-2567. Cannot be used with other discount or coupon or prior purchases after 30 days from original purchase with original receipt. Offer good while supplies last. Non-transferable. Original coupon must be presented. Valid through 2/26/16. Limit one coupon per customer per day.

SUPER COUPON

14" OSCILLATING SPINDLE SANDER

SAVE \$50

\$99.99
REG. PRICE \$149.99

35164015

LIMIT 3 - Good at our stores or HarborFreight.com or by calling 800-423-2567. Cannot be used with other discount or coupon or prior purchases after 30 days from original purchase with original receipt. Offer good while supplies last. Non-transferable. Original coupon must be presented. Valid through 2/26/16. Limit one coupon per customer per day.

SUPER COUPON

350 LB. CAPACITY FOLDING SAW HORSE

SAVE 37%

\$9.99
REG. PRICE \$15.99

3516105

LIMIT 5 - Good at our stores or HarborFreight.com or by calling 800-423-2567. Cannot be used with other discount or coupon or prior purchases after 30 days from original purchase with original receipt. Offer good while supplies last. Non-transferable. Original coupon must be presented. Valid through 2/26/16. Limit one coupon per customer per day.

SUPER COUPON

4 PIECE 1" x 15 FT. RATCHETING TIE DOWNS

SAVE 60%

\$7.99
REG. PRICE \$19.99

35115138

LIMIT 7 - Good at our stores or HarborFreight.com or by calling 800-423-2567. Cannot be used with other discount or coupon or prior purchases after 30 days from original purchase with original receipt. Offer good while supplies last. Non-transferable. Original coupon must be presented. Valid through 2/26/16. Limit one coupon per customer per day.

SUPER COUPON

2.5 HP, 10" TILE/BRICK SAW

SAVE \$170

\$229.99
REG. PRICE \$399.99

3512101

LIMIT 4 - Good at our stores or HarborFreight.com or by calling 800-423-2567. Cannot be used with other discount or coupon or prior purchases after 30 days from original purchase with original receipt. Offer good while supplies last. Non-transferable. Original coupon must be presented. Valid through 2/26/16. Limit one coupon per customer per day.

LOWEST PRICES *EVERYDAY*



**600 Stores
Nationwide**

WOW SUPER COUPON

Customer Rating
★★★★★

NEW

12" SLIDING COMPOUND DOUBLE-BEVEL MITER SAW WITH LASER GUIDE

CHICAGO ELECTRIC POWER TOOLS

LOT 61776/61969/61970/69684 shown

**★ WINNER ★
Best Value Award
- The Family Handyman**

SAVE \$165

\$134.99 REG. PRICE ~~\$299.99~~

LIMIT 3 - Good at our stores or HarborFreight.com or by calling 800-423-2567. Cannot be used with other discount or coupon or prior purchases after 30 days from original purchase with original receipt. Offer good while supplies last. Non-transferable. Original coupon must be presented. Valid through 2/26/16. Limit one coupon per customer per day.

WOW SUPER COUPON

FREE

WITH ANY PURCHASE PITTSBURGH 1" x 25 FT. TAPE MEASURE

LOT 69080 shown 69030/69031

\$6.99 VALUE

LIMIT 1 - Cannot be used with other discount, coupon or prior purchase. Coupon good at our stores, HarborFreight.com or by calling 800-423-2567. Offer good while supplies last. Shipping & Handling charges may apply if not picked up in-store. Non-transferable. Original coupon must be presented. Valid through 2/26/16. Limit one FREE GIFT coupon per customer per day.

WOW SUPER COUPON

PREMIUM RETRACTABLE AIR HOSE REEL WITH 3/8" x 25 FT. HOSE

CENTRALPNEUMATIC

LOT 69266/46104 69234 shown

SAVE \$50

\$49.99 REG. PRICE ~~\$99.99~~

35180020

LIMIT 5 - Good at our stores or HarborFreight.com or by calling 800-423-2567. Cannot be used with other discount or coupon or prior purchases after 30 days from original purchase with original receipt. Offer good while supplies last. Non-transferable. Original coupon must be presented. Valid through 2/26/16. Limit one coupon per customer per day.

WOW SUPER COUPON

SAVE 55%

3 GALLON, 100 PSI OILLESS PANCAKE AIR COMPRESSOR

LOT 95275 shown 60637/61615

\$39.99 REG. PRICE ~~\$89.99~~

35246258

LIMIT 5 - Good at our stores or HarborFreight.com or by calling 800-423-2567. Cannot be used with other discount or coupon or prior purchases after 30 days from original purchase with original receipt. Offer good while supplies last. Non-transferable. Original coupon must be presented. Valid through 2/26/16. Limit one coupon per customer per day.

WOW SUPER COUPON

18 GAUGE 2-IN-1 NAILER/STAPLER

CENTRAL PNEUMATIC

SAVE 55%

LOT 61661 68019 shown

\$15.99 REG. PRICE ~~\$35.99~~

35248597

WE CARRY A FULL LINE OF FASTENERS

LIMIT 6 - Good at our stores or HarborFreight.com or by calling 800-423-2567. Cannot be used with other discount or coupon or prior purchases after 30 days from original purchase with original receipt. Offer good while supplies last. Non-transferable. Original coupon must be presented. Valid through 2/26/16. Limit one coupon per customer per day.

WOW SUPER COUPON

2 HP, 70 GALLON INDUSTRIAL 5 MICRON DUST COLLECTOR

CENTRAL MACHINERY

LOT 61790/97869 shown

\$169.99 REG. PRICE ~~\$249.99~~

35162930

SAVE \$80

LIMIT 3 - Good at our stores or HarborFreight.com or by calling 800-423-2567. Cannot be used with other discount or coupon or prior purchases after 30 days from original purchase with original receipt. Offer good while supplies last. Non-transferable. Original coupon must be presented. Valid through 2/26/16. Limit one coupon per customer per day.

WOW SUPER COUPON

11 PIECE WOOD CARVING SET

WINDSOR DESIGN

LOT 62673 60655 shown

SAVE 40%

\$5.99 REG. PRICE ~~\$9.99~~

35186583

LIMIT 6 - Good at our stores or HarborFreight.com or by calling 800-423-2567. Cannot be used with other discount or coupon or prior purchases after 30 days from original purchase with original receipt. Offer good while supplies last. Non-transferable. Original coupon must be presented. Valid through 2/26/16. Limit one coupon per customer per day.

WOW SUPER COUPON

TORQUE WRENCHES

PITTSBURGH

LOT 2696/61277

1/4" DRIVE

LOT 807/61276

3/8" DRIVE

LOT 62431 239 shown

1/2" DRIVE

\$11.99 REG. PRICE ~~\$29.99~~

35211048

SAVE 60%

LIMIT 7 - Good at our stores or HarborFreight.com or by calling 800-423-2567. Cannot be used with other discount or coupon or prior purchases after 30 days from original purchase with original receipt. Offer good while supplies last. Non-transferable. Original coupon must be presented. Valid through 2/26/16. Limit one coupon per customer per day.

WOW SUPER COUPON

50" CLAMP AND CUT EDGE GUIDE

PITTSBURGH

LOT 66581

\$15.99 REG. PRICE ~~\$24.99~~

35228276

SAVE 36%

Tools sold separately.

LIMIT 6 - Good at our stores or HarborFreight.com or by calling 800-423-2567. Cannot be used with other discount or coupon or prior purchases after 30 days from original purchase with original receipt. Offer good while supplies last. Non-transferable. Original coupon must be presented. Valid through 2/26/16. Limit one coupon per customer per day.

WOW SUPER COUPON

500 LB. CAPACITY STEEL CARGO CARRIER

LOT 69623/66983 shown

\$49.99 REG. PRICE ~~\$99.99~~

35233343

SAVE \$50

LIMIT 4 - Good at our stores or HarborFreight.com or by calling 800-423-2567. Cannot be used with other discount or coupon or prior purchases after 30 days from original purchase with original receipt. Offer good while supplies last. Non-transferable. Original coupon must be presented. Valid through 2/26/16. Limit one coupon per customer per day.

WOW SUPER COUPON

17 FT. TYPE 1A MULTI-TASK LADDER

LOT 62514/62656 67646 shown

\$119.99 REG. PRICE ~~\$199.99~~

35236996

SAVE \$80

300 lb. Capacity

23 Configurations

LIMIT 5 - Good at our stores or HarborFreight.com or by calling 800-423-2567. Cannot be used with other discount or coupon or prior purchases after 30 days from original purchase with original receipt. Offer good while supplies last. Non-transferable. Original coupon must be presented. Valid through 2/26/16. Limit one coupon per customer per day.

WOW SUPER COUPON

60 LED SOLAR SECURITY LIGHT

LOT 62534/69643 shown

\$31.99 REG. PRICE ~~\$59.99~~

35174452

SAVE 46%

Includes 6V, 900 mAh NiCd battery pack.

LIMIT 3 - Good at our stores or HarborFreight.com or by calling 800-423-2567. Cannot be used with other discount or coupon or prior purchases after 30 days from original purchase with original receipt. Offer good while supplies last. Non-transferable. Original coupon must be presented. Valid through 2/26/16. Limit one coupon per customer per day.

WOW SUPER COUPON

10", 12 SPEED BENCH MOUNT DRILL PRESS

CENTRAL MACHINERY

LOT 60237 shown 44836/62408

\$99.99 REG. PRICE ~~\$199.99~~

35183216

SAVE \$100

LIMIT 4 - Good at our stores or HarborFreight.com or by calling 800-423-2567. Cannot be used with other discount or coupon or prior purchases after 30 days from original purchase with original receipt. Offer good while supplies last. Non-transferable. Original coupon must be presented. Valid through 2/26/16. Limit one coupon per customer per day.

WOW SUPER COUPON

4000 PEAK 3200 RUNNING WATTS 6.5 HP (212 CC) GAS GENERATORS

PREDATOR GENERATOR

LOT 69729/68528/69676 shown

\$299.99 REG. PRICE ~~\$499.99~~

35198875

SAVE \$200

70 db Noise Level

SUPER QUIET

LOT 69675/69728 CALIFORNIA ONLY

LIMIT 5 - Good at our stores or HarborFreight.com or by calling 800-423-2567. Cannot be used with other discount or coupon or prior purchases after 30 days from original purchase with original receipt. Offer good while supplies last. Non-transferable. Original coupon must be presented. Valid through 2/26/16. Limit one coupon per customer per day.

WOW SUPER COUPON

drillmaster 1500 WATT DUAL TEMPERATURE HEAT GUN (572°/1112°)

LOT 96289 shown 62340/62546

\$8.99 REG. PRICE ~~\$29.99~~

35258367

SAVE 70%

LIMIT 6 - Good at our stores or HarborFreight.com or by calling 800-423-2567. Cannot be used with other discount or coupon or prior purchases after 30 days from original purchase with original receipt. Offer good while supplies last. Non-transferable. Original coupon must be presented. Valid through 2/26/16. Limit one coupon per customer per day.

• 100% Satisfaction Guaranteed
• Over 25 Million Satisfied Customers

• No Hassle Return Policy
• Lifetime Warranty On All Hand Tools

• 600 Stores Nationwide
• HarborFreight.com 800-423-2567

Small Shop Journal

Hexagonal Table Lamp

By Larry Okrend



This casual contemporary lamp can be used as a table lamp or as a desk lamp. The tapered hexagonal shape requires several steps to make but is relatively easy to accomplish with a band saw.

Lamp making may be one of the most addictive of all woodworking projects, but it's unquestionably one of the most useful. There are endless design variations to explore, and making a lamp is an ideal small-shop project.

Although lamp making is often associated with woodturning, you don't need a lathe to make a great-looking lamp, but you do need a band saw for this one.

Making this lamp's tapered hexagonal body is straightforward using a band

saw with the aid of a tapering jig (see *Drawing*, page 70). The lamp can be made using almost any wood or combination of woods. (I used hard maple to make the body and mahogany for the top cap and base.) The thick stock gives the lamp some heft so it's stable and difficult to topple. You'll also need a lamp wiring kit and a lampshade, which are readily available

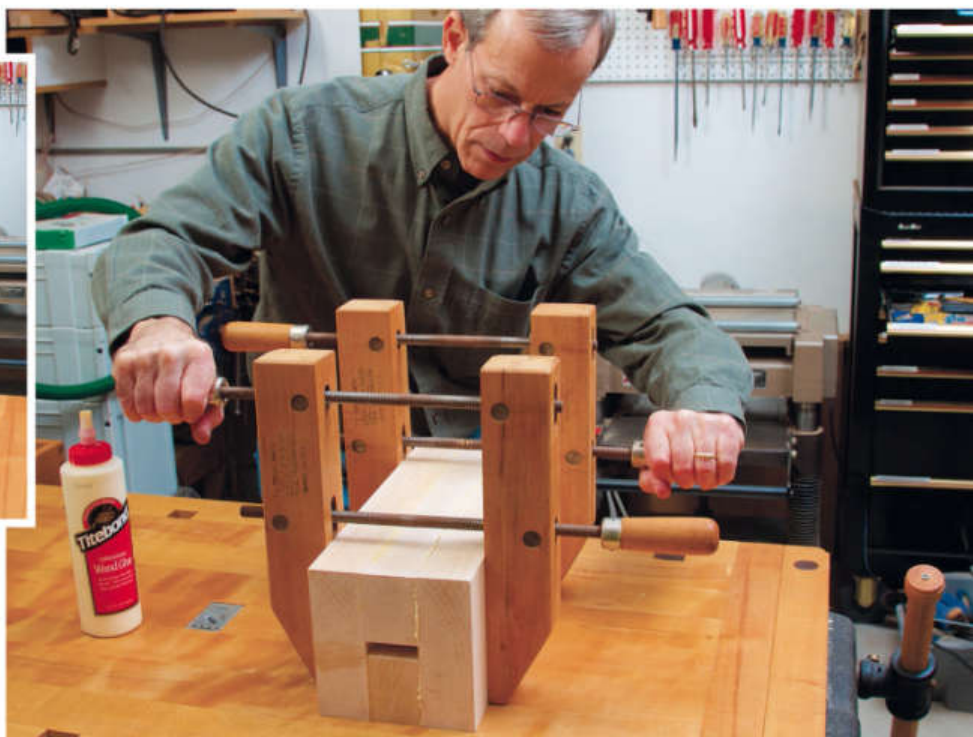
at hardware stores, home centers and from online retailers.

Prepare the Stock

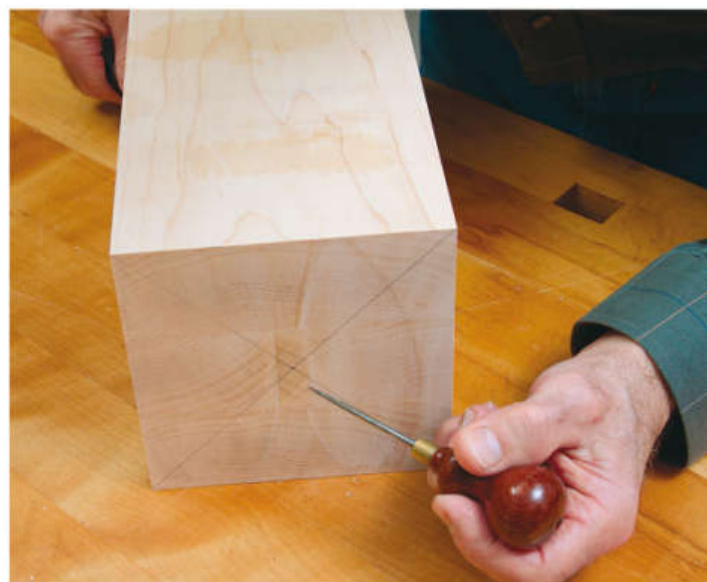
The lamp body is made from four pieces of 8/4 maple, but you could glue together thinner stock to achieve the required thickness. The glued blank has a hollow center channel that provides wiring access (see *Drawing*, page 72). Gluing the stock also makes it more stable and allows you to orient the wood for a pleasing grain pattern.



Glue together the four lamp body parts. Use a spreader to evenly distribute glue on all the mating surfaces and align the edges as precisely as possible. Adjust the handscrews to provide even clamping force and prevent the pieces from slipping out of position. If necessary, you can trim the ends square with a miter saw after the glue has cured.



Cut end plugs to fit the center channel and glue them in place. The plugs allow you to center the lamp body on the band saw tapering jig.



You'll bore holes in the stock pieces later, but first mark the center point with an awl.

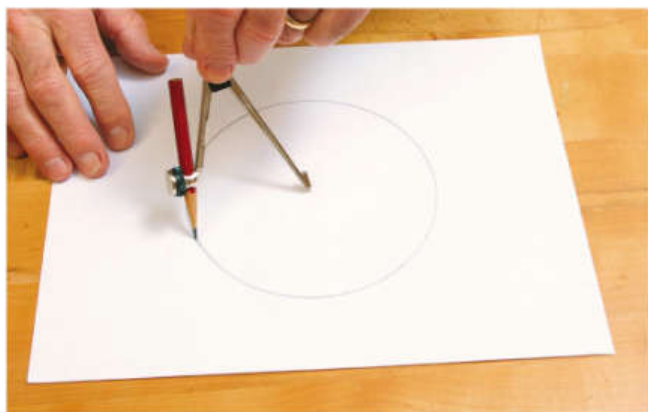
Starting with square pieces helps ensure that the finished lamp is plumb, so jointing and planing the stock is highly recommended. Make your workpieces a little oversize so you can square the glued lamp body blank if needed. (The blank dimension for this project is sized to work with a band saw with a resaw capacity of 6" or greater.) It's also important that the center channel actually remains in the center of the stock as you work so the electrical parts wind up in the right place.

When gluing and clamping the stock, try to keep the pieces from slipping so the edges remain flush. I use wood handscrews to clamp because they provide pressure over a large area and can be adjusted to apply more or less pressure in specific areas.

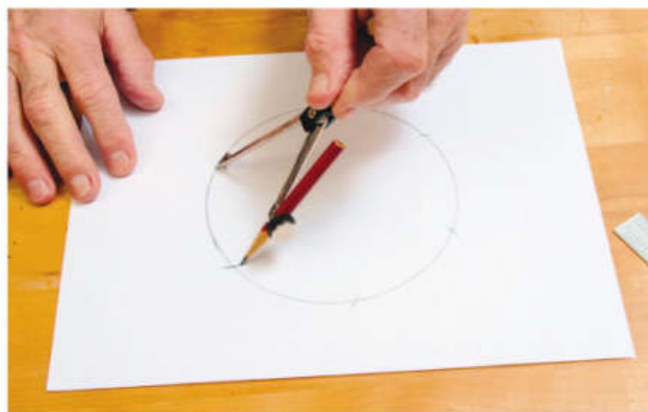
Once you remove the clamps, check that the ends are perpendicular with the sides of the blank. Square the ends if necessary with a band saw or miter saw. Don't worry if the dimensions aren't exactly the same as those in the *Drawing*

— it's unnecessary for a project like this to be that precise.

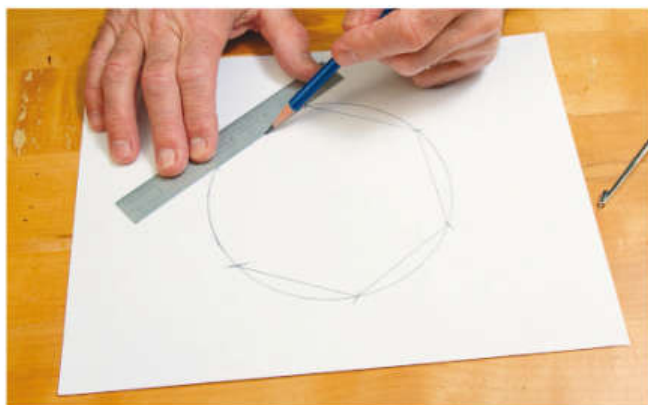
The rectangular end plugs allow the blank to be mounted in the band saw tapering jig, but more on that later. Cut the plugs so they fit snugly in the center channel, then glue them in place and tap them flush with the stock. Now draw diagonal lines on the ends of the stock from corner to corner to locate the center point, which should fall in the middle of the end plugs. Punch a small hole in the centers with an awl.



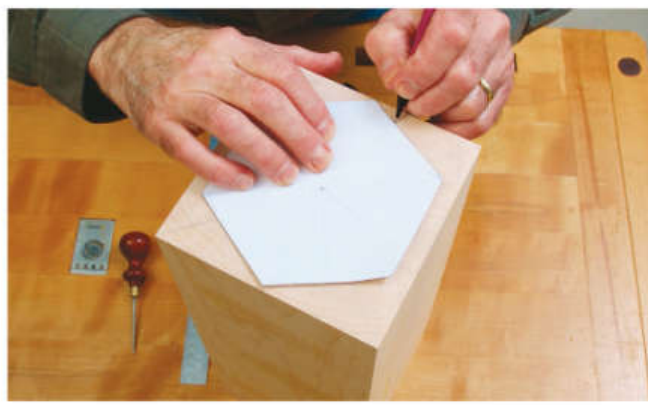
To lay out a hexagon, first use a compass to draw a circle roughly the same diameter as the width of the lamp body blank.



Next, without changing the radius setting of the compass, walk it around the circle's circumference, marking at each interval. This produces exactly six divisions of the circle.



Finally, draw lines between the marks and then cut out the resulting hexagon with a utility knife to make a pattern.



Use the paper pattern to transfer the hexagon to the end of the lamp body, then draw a smaller inside hexagon by measuring in 3/4" from the outside lines. (This will be the top of the lamp.)

Lay Out the Hexagon

Creating a hexagonal pattern is amazingly simple — check out the photos. Use a wing compass to determine the maximum size of a circle that will fit on the end of your stock. Using the radius measurement, draw a circle on paper or cardboard (or on the stock). Without changing the compass setting, strike off consecutive points around the circle's circumference — you should get exactly six points. Then draw lines between the points to outline the hexagon, and finally cut out the hexagon pattern. Although you can draw directly on the stock, a pattern provides consistent, repeatable results if you plan to make more than one lamp.

Center the pattern on the stock using the awl mark you made earlier and

Continues on page 70 ...



Cutting the hexagon is a two-step process. First, use the band saw to cut the straight sides of the hexagon with the table tilted to about 30°. You can use the saw's fence to guide the workpiece, but you may need to adjust the table and fence before each cut. (Be sure to save one of the waste pieces; you'll see how you use it in the top right photo on page 74.)

PROFESSIONAL HVLP



Introducing the SprayPort® 6000 Series for a Flawless Finish

- Compact and robust 2 or 3-stage base turbine
- Pro-8™ non-bleed gun in gravity or pressure-fed options for superior atomization
- 25' Lightweight and flexible HyperFlex™ hose

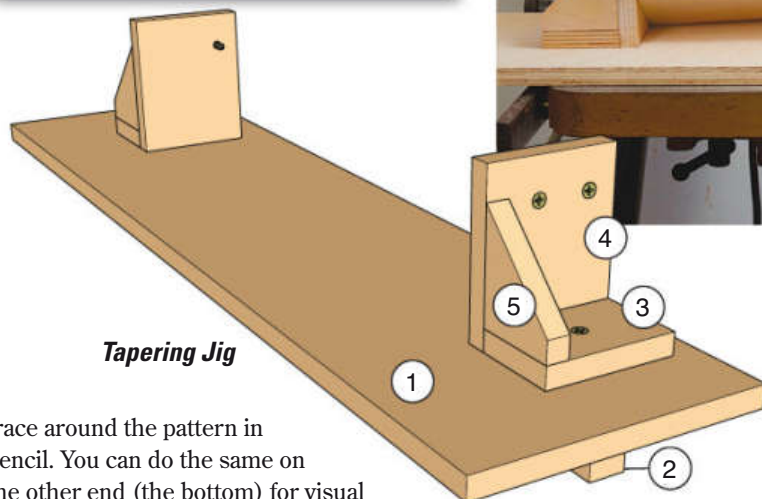


6000
series

www.earlex.com

MATERIAL LIST (Jig)

	T x W x L
1 Base (1)	1/2" x 6 1/2" x 26"
2 Miter Bar (1)	3/8" x 3/4" x 26"
3 Mounting Block Base (2)	1/2" x 2" x 3"
4 Mounting Block Upright (2)	1/2" x 3" x 3 3/4"
5 Mounting Block Support (2)	1/2" x 2" x 2 1/2"



Tapering Jig

trace around the pattern in pencil. You can do the same on the other end (the bottom) for visual reference when cutting, but it's optional. Now draw a smaller inside hexagon by measuring 3/4" from each line. This delineates the starting point for the taper on the top end.

Make the Tapered Hexagon

Cutting the tapered hexagon is a two-step process that requires a band saw jig (see *Drawing*, above) for the second step. (If your band saw has a resaw capacity greater than 6", it may be possible to do this in one step with the jig.) Understanding the jig's operation is more important than duplicating its dimensions because band saw table sizes differ. The jig's purpose is to guide the stock through the blade at an angle.

The jig's base is 1/2" plywood with a runner on the bottom that fits into the band saw's miter gauge slot. The workpiece is held by adjustable mounting blocks on each end that are sized to allow the stock to rotate and just touch the base. It's important to use only one screw to attach each mounting block to the base because they need to pivot to remain parallel with workpiece ends.

The first set of cuts you'll make on the band saw produces a straight hexagonal column. Use a 1/2" or wider blade to

*Next, use the tapering jig (see *Drawing*) to guide the workpiece through the band saw. Position the jig mounting blocks so the back (bottom) of the lamp body is flush with the outside edge of the blade and the front (top) is set to start the cut on the marked inside hexagon. (Note that the second screw on the mounting block prevents the workpiece from rotating.)*

minimize blade deflection. Position the saw's fence to the outside of the blade and tilt the table toward you about 30°. (You may want to adjust the fence to accommodate blade drift; check your saw's instruction manual.) Then adjust the fence and blade to align with one edge of the hexagon drawn on the top of the workpiece. Make the first cut; then rotate the workpiece and adjust the fence and table to align the blade for the next cut. Repeat this operation until you've cut all six sides. Save at least one of the cutoffs; you'll need this later for routing the relief cuts in the lamp body.

Now you'll need to mount the workpiece in the tapering jig. Here's the sequence that worked best for me: First, screw the bottom mounting block to the center of the bottom of the workpiece, but don't attach the mounting block to the jig's base yet. Roughly center the

workpiece on the jig. Position the jig with its track in the saw's miter gauge slot and align one of the bottom edges of the hexagon against the blade. Now screw the bottom mounting block to the jig's base. Next, attach the top mounting block to the top of the workpiece and slide the jig back so the blade just touches the top of the workpiece. Rotate the workpiece from the bottom mounting block so the blade aligns with one of the lines of the smaller inside hexagon drawn on the top. Screw the top mounting block to the base and recheck the blade alignment with the small hexagon. Finally, screw one or both of the mounting block lock screws slightly into the stock to prevent the workpiece from rotating. Now you can cut the tapers by rotating and cutting.

Continues on page 72 ...



Full Size Plans
Detailed with full size drawings & text



Plan #82 \$18.50
Cycle Rocker For advanced woodcrafters. Size 44"l x 27"h.



Plan #62 Cradle \$18.95
Swinging Baby Cradle 21"x31"x39"H

16 Pg catalog of plans/parts \$1 or free with order

More plans @ armorplans.com

Plan #24 \$14.95
Pony Rocker is 36" L x 24" H

Visa/MC call
800 292 8296

Armor Box 576 Monterey TN 38574



WOODWORKERS
Specializing in Woodworking Tools & Supplies

100%
Satisfaction Guarantee
Every Order

LUMBER YOU'LL LOVE
Maple, Walnut, Cherry +100 more

Enjoy friendly service & easy online ordering

www.101woods.com

VISA MasterCard American Express PayPal 800-423-2450



BADGER HARDWOODS
of Wisconsin, Ltd.

Great selection of premium hardwoods and plywoods, custom mouldings, bulk packs, and more!

Call Badger Bob Today!
(800)252-2373

WWW.BADGERWOOD.COM
badgerwood@badgerwood.com

Est. 1986
Walworth, WI

ENGRAVE IT. CUT IT. MARK IT.
The Finishing Touches Start Here.






MADEINUSA

Contact Epilog Laser
for a laser system demo!
www.epiloglaser.com/wwj

EPILOG LASER

Rout a beautiful family heirloom.

Sign Making "Headquarters"

Keepsake Box Sets

Rout Picture Frames in one pass

Bowl and Tray templates



EagleAmerica.com
#1 Router Bit Made In The USA!


WOODWORKER'S JOURNAL POWER TOOL MAINTENANCE DVD

Learn how to take good care of your power tools with the detailed written and video instructions on this DVD-ROM. We cover everything you need to know!

Item #56228 \$9.99

CALL 800-610-0883
(mention code WJ1564)
or order online:
woodworkersjournal.com/wj1564

POWER TOOL MAINTENANCE
How to properly tune up and maintain the most common power tools in your woodworking shop.



OVER 150 PHOTOS AND OVER 60 MINUTES OF VIDEO

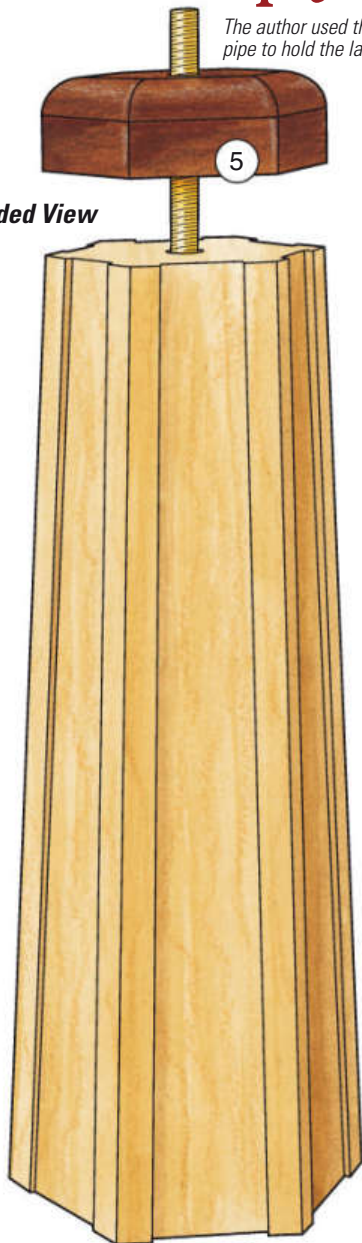
WOODWORKER'S JOURNAL
www.woodworkersjournal.com

DVD

Small Shop Journal continued

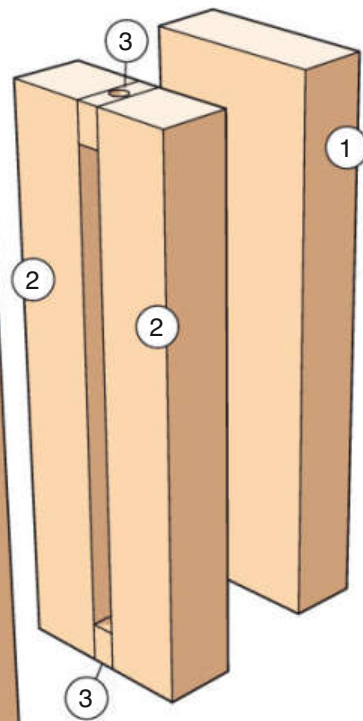
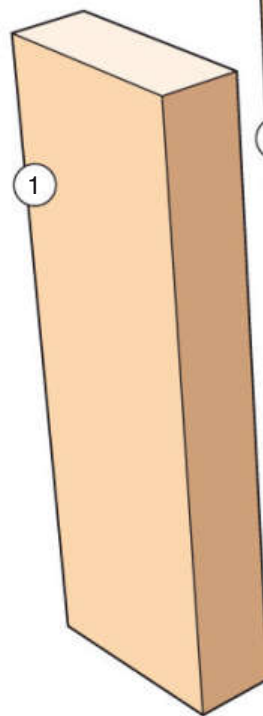
The author used threaded lamp pipe to hold the lamp harp.

Exploded View



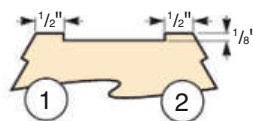
MATERIAL LIST

	T x W x L
1 Lamp Body Stock, Wide (2)	1 7/8" x 5 5/8" x 14 1/4"
2 Lamp Body Stock, Narrow (2)	1 7/8" x 2 1/2" x 14 1/4"
3 End Plugs (2)	5/8" x 1" x 1 7/8"
4 Base (1)	1 1/4" x 6 3/4" x 6 3/4"
5 Top Cap (1)	1 1/4" x 4" x 4"
6 Feet (6)	1/4" x 1" x 1 1/4"

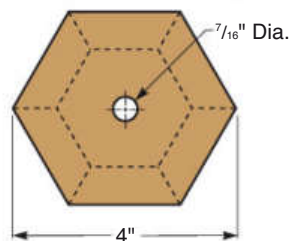
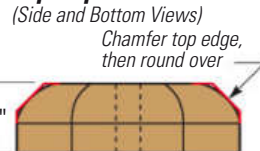


Lamp Body Assembly Exploded View

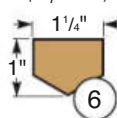
Lamp Body Groove Layout (Bottom View)



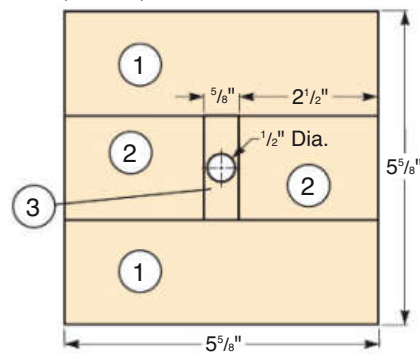
Top Cap (Side and Bottom Views)



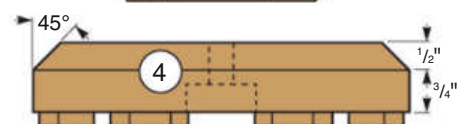
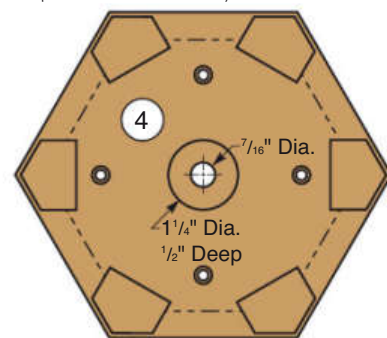
Foot (Top View)



Lamp Body (End View)



Base (Bottom and Side Views)



Continues on page 74 ...

UNIQUE SOLUTIONS



Our Dust Bags Feature

- Optimum Performance
- 1-Micron Filtration
- Custom Designs
- Cleaner Air
- Longer Life
- Proudly Made In USA

Other Products We Offer

- 6-mil Poly Bags
- Quick Release Hose Clamps
- Self Adhesive Foam Gasket
- Custom Transfer Sleeves
- Cartridge Filters



We Fix Dust Collection Problems!

Free Design Assistance for All Custom Made Dust Bags

AMERICAN FABRIC FILTER CO.

www.americanfabricfilter.com 800-367-3591

Table Slides

866.963.5601



OSBORNE
Wood Products, Inc.

www.woodencomponents.com

STATEMENT OF OWNERSHIP, MANAGEMENT AND CIRCULATION (Required by 39 USC 3685) 1. Publication Title: Woodworker's Journal. 2. Publication No. 0199-1892. 3. Filing Date: October 1, 2015. 4. Issue Frequency: bimonthly. 5. No. of issues published annually: six. 6. Annual Subscription Price: \$19.95. 7. Complete mailing address of the publication office: 4365 Willow Dr., Medina, MN 55340. 8. Complete mailing address of the headquarters: 4365 Willow Dr., Medina, MN 55340. 9. Full names and mailing address of publisher and editor in chief: Rob Johnstone, Publisher; Joanna Takes, Editor. Rockler Press, Inc., 4365 Willow Dr., Medina, MN 55340. 10. Owner, names and addresses of stockholders: Rockler Press, Inc.; Ann Rockler Jackson, 4365 Willow Dr., Medina, MN 55340. 11. Not applicable. 12. Not applicable. 13. Publication Title: Woodworker's Journal. 14. Issue date for circulation data below: September/October 2015. 15. Extent and nature of circulation is:

	Average no. copies each issue during preceding 12 months	Actual no. of single issue pub. nearest to filing date
A. Total no. copies (net press run)	151,586	147,218
B. Paid and/or requested circulation		
1. Mail subscription	147,532	143,210
3. Sales: dealers, carriers, counter & vendors	870	870
C. Total paid and/or requested circulation	148,402	144,080
D. Free distribution		
3. By mail samples, complimentary and other free	540	545
4. Outside the mail	552	534
E. Total free distribution	1,092	1,079
F. Total distribution	149,494	145,159
G. Copies not distributed	2,092	2,059
H. Total	151,586	147,218
I. Percent paid and/or Requested Circulation	99.3%	99.3%

16. This statement of ownership will be printed in the November/December 2015 issue of this publication. I certify that the statements made by me above are correct and complete. Rob Johnstone, Publisher - 09/08/15.

FASTX4®

QUICKLY CHANGE BETWEEN SIZES & SERIES IN SECONDS!



FAST LOCK
PATENT SYSTEM

THE NEW HOLE SAWS

MULTI-PURPOSE

SERIES 550

TUNGSTEN CARBIDE TEETH FOR LONGER LIFE
Ideal for: Wood, MDF, PVC, Fiberglass, Brick & Tile

BI-METAL PLUS

SERIES 551

DESIGNED WITH 8% COBALT FOR SUPERIOR LIFE
Ideal for: Metal, Stainless Steel, Aluminum & Cast Iron

DIAMOND DRY

SERIES 552

DIAMOND GRIT DESIGN FOR XTREME LIFE
Ideal for: Ceramic or Porcelain Tile, Granite, Hard Stone, Brick, Cement Board & Masonry. **DRY CUT!**

THE NEW RECIP SAW BLADES

Why tooth geometry is important!

A BLADE FOR EVERY APPLICATION!



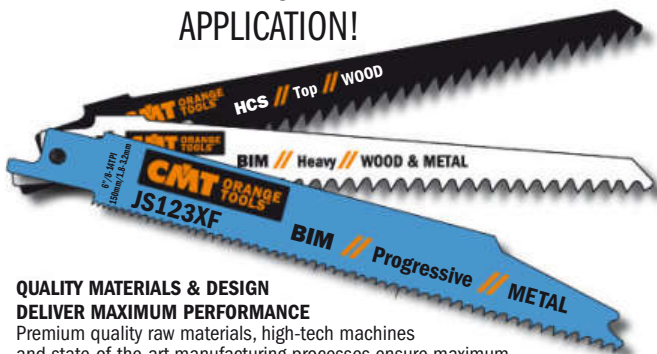
Designed to easily cut wood, plywood, framing lumber and plastic.



Designed for Xtreme cuts into hard or soft wood, plastic and ferrous or non-ferrous metal.



Designed for fine and precise cuts into thin or thick metal, pipe and open or closed profiles.



QUALITY MATERIALS & DESIGN

DELIVER MAXIMUM PERFORMANCE

Premium quality raw materials, high-tech machines and state-of-the-art manufacturing processes ensure maximum lifetime and performance from CMT's new line of reciprocating saw blades.

Our new **2015-2016 CATALOG** on www.cmtusa.com

CMT ORANGE TOOLS™

TM: CMT, the CMT logos, CMT ORANGE TOOLS and the orange color applied to tool surfaces are trademarks of C.M.T. UTENSILI S.P.A. © C.M.T. UTENSILI S.P.A. ITALY

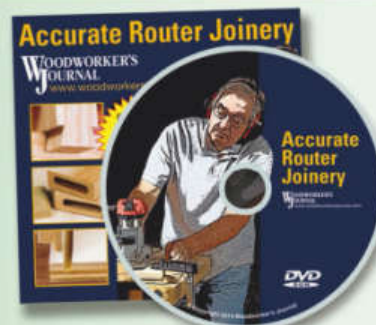
CMT USA, INC.
7609 Bentley Road Suite D
Greensboro, NC 27409

phone: 336.854.0201
toll-free: 888.268.2487
Fax: 336.854.0903
Free-Fax: 800.268.9778
info@cmtusa.com
www.cmtusa.com

WOODWORKER'S JOURNAL

Accurate Router Joinery DVD-ROM

Good joinery demands some of the most exacting cuts in woodworking, and that is exactly what the router excels at. In this DVD-ROM, you'll learn to put the full precision and power of the router to work for you. Easy-to-read articles paired with videos guide you through the steps to a picture-perfect result!



Item #58224 \$9.99

CALL **800-610-0883** (mention code **WJ1565**)

or order online: www.woodworkersjournal.com/wj1565



Remove the saw marks from the lamp body with a hand plane or use a jointer. Securely brace the workpiece to prevent damage. Then bore the center holes on the top and bottom with a 1/2"-diameter bit.



Use a router table and a 3/8" straight bit to rout the decorative relief cuts in the lamp body. Attach one of the waste pieces from sawing the hexagon to the router table fence. This provides the needed clearance for routing and provides support.

Once you've completed the cuts, you'll need to remove the saw marks from the workpiece. I used a hand plane because it provides a clean, crisp, controlled cut. You could also use a jointer or a sander, but be careful not to remove too much stock. Now's a good time to bore a 1/2" hole in each end to open the center channel for wiring.

Rout the Relief Cuts

The decorative relief cuts add dimension and visual interest to the lamp body by emphasizing its hexagonal shape. For safety's sake, it's best to use a router table for this step because it provides excellent support and control for the workpiece.

Use a 3/8" or 1/2" flat-bottom straight bit to rout the 1/8"-deep relief channels. Attach the cutoff (saved earlier) from making the hexagon to the router table's fence with brads or carpet tape. The cutoff provides stock support and the clearance necessary to keep the router bit parallel with the workpiece edges. Make steady, multiple passes to remove the stock between the raised edges. Turn the workpiece around and adjust the fence so the cut starts on the opposite edge to complete the work.

You'll need to sand the relief channels, so start with 120-grit paper and work your way up to 220-grit. Then sand the edges, and you'll be ready to make the remainder of the parts.

on the band saw, but leave it just slightly large to allow for some fine-tuning. Mark one mating edge on the lamp body and top cap to ensure alignment during assembly.

The base's tolerances don't need to be quite so exact, so simply lay out a hexagon on the stock, then cut it on the band saw. Once it's cut, you'll need to counterbore a 1/2"-deep x 1 1/4"-diameter hole in the bottom of the base to accommodate the end of the threaded lamp pipe and nut. Then bore a 7/16" hole through the center of the base and the top cap for the lamp pipe.

Using the band saw, cut 45° chamfers on the top edges of the base and top cap. Aside from sanding the sawn edges, I shaped the top's upper surfaces, starting at the chamfers, with files and sandpaper to create a more rounded profile where it meets the metal lamp neck. When you're satisfied with the fit and appearance of the top cap, glue it onto the lamp body with either epoxy or cyanoacrylate.

The feet afford a more finished look to the base and allow space for the electrical cord to exit. Make a strip of 1/4"-thick x 1 1/4"-wide x 10"-long stock and trace the corner onto the strip for six 1"-long pieces. Cut these pieces on the band saw and then sand the edges smooth. Glue the feet at the corners of the base about 1/16" back from the



After routing the channels, trace the top of the lamp body onto the stock for the top cap. The piece may not be perfectly symmetrical, so mark corresponding edges on the body and cap for registration. (The base doesn't require this degree of precision.)

Top, Base, Feet

If you prefer, you can use a contrasting wood for the top cap, base and feet. The top cap must fit precisely on the lamp body top. However, it's unlikely that the lamp body is perfectly symmetrical, so you need to trace the top onto the top-cap stock for a perfect fit. Cut the piece

Continues on page 76 ...

WEST PENN
HARDWOODS, INC.

EXOTIC WOOD WONDERLAND!

The Largest Importer of Exotic Hardwoods From Pen Blanks to the Whole Log!

Check out our HUGE slab inventory
Turning Wood * Pen Blanks * Unique Boards Lumber
Thin-Dimensioned Lumber * Burls * Bottle Stoppers
Bowl Blanks * Peppermill Stock * Guitar Sets
Luthier Wood Combo Pack Deals * Live Edge Flitches
...and much, much more!!

USE COUPON CODE WJ10 TO RECEIVE 10% OFF
YOUR ONLINE ORDER

www.westpennhardwoods.com

1405 Deborah Herman Rd., Conover, NC 28613
828-322-9663 * support@westpennhardwoods.com



LINE BOXES IN SECONDS...

"Suede-Tex" spray-on suede

No skill required • 30+ colors

800-336-6537 • www.flockit.com

FLOCK IT! Ltd

13142 Murphy Rd.,
Winnebago, IL 61088

Formerly...
DonJer Products
new name, same great
product and service!



**Step-by-Step to
a Perfect Finish**

Featuring Michael Dresdner,
the nation's foremost finishing expert,
and JoAnne Liebler, television's
favorite home improvement expert.

Whether you're
a beginner or
an experienced
finisher, you'll
find a wealth of
must-have
information in
this DVD. It's
everything you
need to know to get a perfect
finish every time!



Item #46512 \$29.99

CALL 800-610-0883

(mention code WJ1563)

Order online at:

woodworkersjournal.com/wj1563

Sponsors include ...



NEW! Router Table Dovetail Jig

by Leigh



LEIGH RTJ400

**Rout Both Boards
at The Same Time**

- Half-Blind Dovetails
- Through Dovetails
- Box Joints

SEE VIDEO

leighjigs.com



**LOWEST PRICE EVER
on DR® Leaf and Lawn Vacuums!**

**NEW
Models**

Starting at
\$1,299⁹⁹



- ✓ **Rated #1 in Vacuum Power**
- ✓ **Easy, 1-Hand Dumping**
- ✓ **Stores Flat in Minutes**
- ✓ **Converts to a Rugged Utility Trailer**

The NEW DR® Leaf Vacuum is designed from the top down to make yard clean up easier, faster, and more thorough than ever before. And for a limited time we are offering them at incredible low introductory prices!



Unload with just one hand!



Doubles as a utility trailer!

FREE SHIPPING

1 YEAR TRIAL

SOME LIMITATIONS APPLY
Call or go online for details.

Call for **FREE DVD and Catalog!**

TOLL FREE **877-201-7888**

DRleafvac.com



88902X © 2015



Use a Forstner bit to drill a 1/4" counterbore in the bottom of the base to accommodate the threaded lamp pipe and nut for wiring. Then bore centered 7/16" holes in the top cap and base.



Tilt the band saw table to 45° and cut the chamfered edges on the base and the top cap. The top cap chamfers will need to be shaped to transition into a rounded form on its top and then glued in place.

www.woodworkersjournal.com **MORE ON THE WEB**



For a video on making the lamp's tapered hexagonal base with a jig, please visit woodworkersjournal.com and click on "More on the Web" under the Magazine tab.



Glue the feet to the base before finishing. After finishing, fasten the base to the lamp body with #8 x 2" wood screws. When assembling the lamp, use a protective surface on your bench, such as rubber shelf liner or a piece of carpeting, to prevent damage.



Cut the threaded lamp pipe to fit the lamp and assemble the lamp kit parts. All the threaded parts must be secured before pulling the wire through the lamp pipe.

edge. You might also want to add a few pin nails to secure them.

After finishing, you'll attach the base to the lamp body with four #8 x 2" wood screws, but drill and countersink the screw holes now. Then place the lamp body on the base and center it. Mark the base screw hole positions on the lamp body and then drill pilot holes.

Assemble and Install Wiring

Everyone has a favorite finish, and because lamps typically don't experience a lot of wear and tear, don't hesitate to use what you like. I applied a few coats of clear aerosol lacquer, rubbing between coats with 0000 steel wool and a soft cotton rag. This finish provides enough protection and imparts a soft glow to the wood. Finish the base separately from the lamp body and top

cap. When the finish has cured, screw the base to the lamp body, and you'll be ready to wire.

Most lamp kits provide some wiring instruction, but here are a few tips that can ease the process. First, cut the threaded lamp pipe so it extends about 1/4" at the top and bottom. Use a file to round any sharp edges on the inside and outside of the tube to prevent damaging the wire. Insert the tube through the lamp and install the locknut on the bottom and the neck on top and then tighten. Now install the harp bottom over the lamp nipple (on top of the neck) and screw the socket cap onto the nipple. Thread the wire from the bottom through the lamp pipe and into the socket cap. Pull enough wire to connect to the socket and tie an underwriter's knot to prevent the wire from being pulled off the terminals. Connect the wires to the terminals, finish assembling the socket, and finally add the harp and lampshade. The final touch is to add some nonslip protective pads on the feet (item #43518 at rockler.com; 800-279-4441).

With this lamp's construction now under your belt, you're likely full of ideas how to improve it, make multiples of it and branch off into making your own designs. Just be careful not to have all those new lamps turned on at the same time, or you could experience a big spike in your electric bill.

Larry Okrend is the former editor of *HANDY* magazine.

Make hinge installation an open-and-shut case



Your project is finished except for the hinge installation. This is make or break time. Luckily, now there's a jig to insure your hinges are installed perfectly and this project becomes the prized heirloom you intended. The new JIG IT Hinge Mortising System—another innovation from Rockler to help you *Create with Confidence*.

JIG IT Hinge Mortising System (58822) \$49.99
(Templates Sold Separately)

FREE SHIPPING!

On orders of \$25 or more

For details go to rcklr.co/659 or
call 1-800-279-4441 and mention code 659
at checkout. Offer expires December 31, 2015.



ROCKLER®
WOODWORKING AND HARDWARE

Create with Confidence™

For a store near you or free catalog:
Rockler.com | 1-877-ROCKLER

What's In Store

Tools for Precision

Contact Information

Apollo Sprayers
888-900-4857

Calculated Industries
800-854-8075

DeWALT
800-433-9258

Dremel
800-437-3635

Milwaukee Tool
800-729-3878

Rockler
800-279-4441

RIDGID
800-474-3443

Schiffer Publishing
610-593-1777

WORX
866-354-9679

The **Rockler Clamp-It® Corner Clamping Jig** can hold panels upright at a precise right angle for fastening, acting as an extra set of “hands.” The Clamp-It Corner Clamping Jig (item 58918) is used in conjunction with the Rockler Clamp-It (item 29190) and can be used in sets of four. The jig holds panels up to 1" thick exactly 3/4" off the work surface so you can use scrap boards to support other corners if you're only using one jig at a time. Soft pads on the Corner Clamping Jig prevent marring of your workpiece, while mounting holes allow you to attach the jig to your work surface. The Clamp-It Corner Clamping Jig is priced at \$27.99.

RIDGID is now offering 18-volt cordless nailers with the power of a pneumatic nailer in a cordless tool. **HYPERDRIVE™** technology eliminates the need for a compressor, hose or gas cartridge, offering faster setup and easier maneuvering on the jobsite. Both the **R09890B 2½" HYPERDRIVE Brad Nailer** and the **R09892B 2½" Straight Finish Nailer** run off of brushless motors and are compatible with all RIDGID 18-volt slide battery packs. They have tool-free depth-of-drive adjustment, dry-fire



lockout, tool-free power adjustment and a grip light that engages independently of the trigger. The 2½" Brad Nailer drives 18-gauge nails from 5/8" to 2½" and can install up to 2,600 linear feet with 2,000 nails per charge, while the 2½" Straight Finish Nailer drives 16-gauge nails from 3/4 inch to 2½" and can install up to 1,900 linear feet with 1,450 nails per charge. Suggested price for the Brad Nailer is \$229; for the Finish Nailer, it's \$269.

1/16" high; fully inflated, it's 2½". It weighs 3.5 ounces. The AirShim is meant to eliminate the need for shims

A new product from **Calculated Industries** is the **AirShim Inflatable Pry Bar and Leveling Tool**. Operated by a hand pump, the AirShim can be adjusted to span gaps from 3/32" to 2½" and will support up to 300 pounds. You can use it to lift, shift, align, level, plumb or adjust materials, or to pry objects apart without damage — its soft surface won't scratch. The AirShim bag itself is 6" x 6.5". When deflated, it's about



Calculated Industries
AirShim
Inflatable
Pry Bar and
Leveling Tool

and wedges. In some applications, you may want to use more than one. The AirShim sells for \$24.95.

Continues on page 80 ...



RIDGID Straight
Finish Nailer

Woodworker's Journal subscribers, you'll soon have **exclusive access** to **EVERY** past issue!

**OVER 1,500
PROJECTS!**

Starting in January 2016, magazine subscribers can access **over 1,500 projects, plus great tips and techniques** on **woodworkersjournal.com!**

★ To access a premium article or plan, you'll be prompted to log in with your email address (if on file) or your account number.



Where is **your** account number?



It's printed on the mailing label that's attached to the cover of every issue.

RIGHT HERE

#RXNBCBK***5-DIGIT 50309
#WWJ 0001234567 /2#49 APR01
YOUR NAME HERE 102
1716 LOCUST STREET DV
DES MOINES IA 50309-3038

What's In Store continued



DeWALT 5" Variable Speed Random Orbit Sander



The **DeWALT DWE6423K 5" Variable Speed Random Orbit Sander** features a separate counterweight to minimize vibration and an expanded rubber overmold to increase comfort during use. A rubber dust skirt minimizes dust escaping around the pad. The dust collection port also has a one-handed locking dust bag that works with DeWALT Dust Extractors and Universal Connector System (sold separately). At 140 millimeters high (about 5½"), the DWE6423K is the shortest 5" random orbit sander currently available. It weighs in at 2.9 pounds and delivers 8,000 to 12,000 orbits per minute on a 3/32" orbit, powered by a 3-amp motor. Pricing on the DWE6423K is \$79.

Apollo Sprayers ECO-MINI HVLP Spray Kit with E7200 Spray Gun



The **ECO-MINI HVLP Spray Kit** from **Apollo Sprayers** is targeted to small workshops and semi-pro finishers, and it comes with a choice of two spray guns. The E7200 spray gun is a non-bleeder style turbine HVLP, which comes with a choice of either a 1 quart aluminum cup assembly or an 8 oz. mini cup assembly. It provides full pattern control.

The E6000 spray gun is a bleeder style turbine with a 1 quart cup assembly, an entry-level gun with simple controls that help the novice learn spraying easily. Both are available as choices for the ECO-MINI Spray Kit, which also includes a three-stage motor, 20-foot air hose with aluminum fittings, Handi-Hold™ spray gun docking station and compact metal case with centered carry handle. The system, which

at the same time, and change which one you're using from moment to moment by pressing a button to rotate the chucks into and out of position. The one you're not using stays securely in its chuck, which accepts any 1/4" hex-shaped bit. A vertical guard below the headstock acts as a shield to protect your hand from the bit that's not currently in use, while an LED light above the chuck illuminates the work



WORX 20V MaxLithium Switchdriver

is made in the U.S. in the company's Vista, California, factory, provides a transfer efficiency of 80 to 90 percent for thin to medium viscosity finishes. Pricing with the E72000 Non Bleeder Style Spray Gun is \$549; with the E6000 Bleeder Style Spray Gun, it's \$499.

The **WORX 20V MaxLithium Switchdriver™** can be a drill, and a driver, at the same time. The Switchdriver has two 1/4" chucks: you can insert two bits into the tool

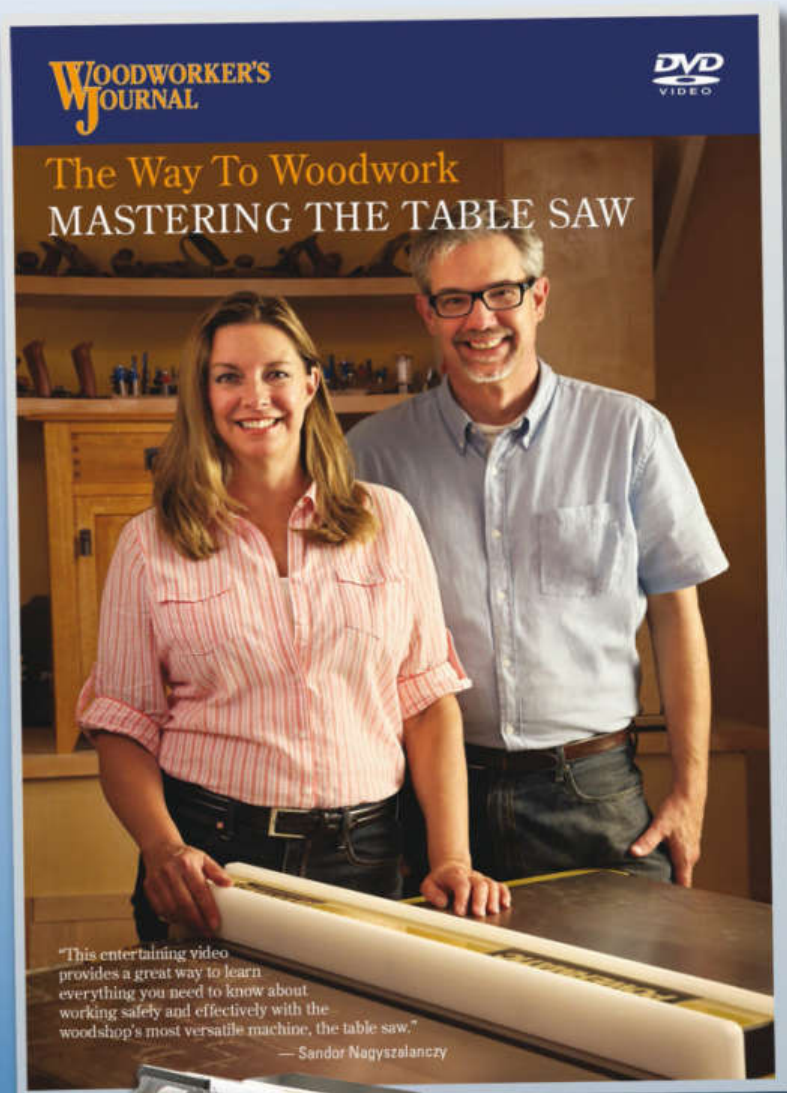
area. The Switchdriver has a two-speed gearbox with no-load speeds of 0-400 and 0-1,500 rpm and an 11-position electronic clutch. Maximum torque is 310 inch-pounds. The Switchdriver's drilling capacity is 1" in wood and 3/8" in steel. Suggested pricing for the Switchdriver, model WX176L (which includes two 1.5 amp-hour batteries, charger, carrying bag, 1/8" and 1/32" drill bits and a #2 Phillips drive bit) is \$119.99.

Continues on page 82 ...

NEW!

WOODWORKER'S
JOURNAL presents

The Way To Woodwork: Mastering the Table Saw



Learn to safely and confidently operate the most important tool in your workshop with the latest installment in *The Way To Woodwork* series: *Mastering the Table Saw*. Our experts teach everything, from the basics of ripping and crosscutting, working up to more advanced techniques. You'll also discover how jigs add versatility, safety and accuracy to your table saw. Expert or rookie, this DVD has something for every woodworker.

Our experts put these techniques to work building a classic Arts & Crafts Nightstand made entirely on the table saw — free plan included!



FREE
White Oak
Nightstand
plan!

Order Yours
TODAY!

The Way to Woodwork:
Mastering the Table Saw
57292 \$29.99

CALL **800-610-0883** (mention code **WJ1562**) Order online at www.woodworkersjournal.com/wj1562

Sponsors
include ...



What's In Store continued

Dremel VRT1



Two new books from
Schiffer Publishing



The **Dremel VRT1**, which Dremel calls the first “dustless” rotary tool, not only connects to a shop vacuum but is actually powered by it. An adapter on the tool’s pen-style grip connects directly to a 1½” shop vacuum nozzle. Once the vacuum is turned on, airflow is drawn through the VRT1’s front dust intake ports, spinning two internal turbine fans to create power and rotation to drive the chuck and producing power similar to a 4.8-volt cordless rotary tool. For maximum power, the VRT1 should be connected to a shop vacuum that develops 110 cubic feet per minute of suction or greater. An On/Off switch allows you to stop the tool but keep the vacuum running. The VRT1 will sand, polish, carve, drill and engrave and is compatible with many of Dremel’s accessory options. It sells for \$29.99.



Milwaukee Tool
M18 FUEL 1/2”
Drill/Driver



Two new books from **Schiffer Publishing** add decorative details to your work. *Deep Relief Wood Carving: Simple Techniques for Complex Projects* by Kevin Walker (ISBN 9780764348211) is a guide for carving a three-dimensional dogwood branch. Power carving and back-cut techniques can be applied to flat-plane furniture or multi-depth relief, in any theme. The book includes tips on specific chisels, router types and transfer methods, as well as chapters on sealing, painting, and building a frame. *Laminated Wood Art Made Easy* by Stephen Carey (ISBN 9780764347306) is about cutting and laminating, or gluing, wood for artistic effect. It covers safety, jig design, tools, wood movement, moisture and more, to guide you in the lamination methods provided, and eventually creating your own. Both books are priced at \$19.99.

Milwaukee Tool has redesigned their M18 FUEL™ drilling and driving line, including the *M18 FUEL 1/2” Drill/Driver* (2703). There’s a new POWERSTATE™ Brushless Motor with higher grade magnets, to

produce higher output power and speed under heavy load. The drill offers 1,200 inch-pounds of torque and speeds of 0-500 and 0-2,000 rpm. The REDLINK PLUS™ Intelligence Hardware and Software has been upgraded with better heat management capabilities to handle the motor’s higher output. A 4-Mode Drive Control™ on the *Milwaukee 1/4” Hex Impact Driver* (2753) includes a self-tapping screw mode, to offer greater control to the user and reduce the amount of time spent slipping off screw heads or stripping and breaking them. The new 18-volt FUEL drills have also been designed to be 1/2” shorter and 1/2-pound lighter than competitors. The 2703 Drill Driver is 7.5” long and weighs 4.9 pounds (with battery), while the 2753 Impact Driver is 5¼” long and (with battery) weighs 3.6 pounds. List price for the 2703-22 is \$279; for the 2753-22, it’s \$299.

BRAKE the Cycle

Control your craft with the new **14|bx Bandsaw**
featuring our ingenious disc brake

14
bx



Once again, **Laguna** has brought innovation to woodworking with the **14|bx**.
Unrivaed in quality and design.

- 110 Volt, 1.75 HP
- 220 Volt, 2.5 HP
- Solid One-Piece Frame
- Cutting Edge Disc Brake with Micro-Switch



Magnetic On/Off



Disc Brake

\$1,399 110 V | \$1,499 220 V

See your **ROCKLER** dealer today!

**Shown with optional mobility kit.*

LAGUNA

LAGUNATOOLS.COM



Woodworking Tools & Supplies Index



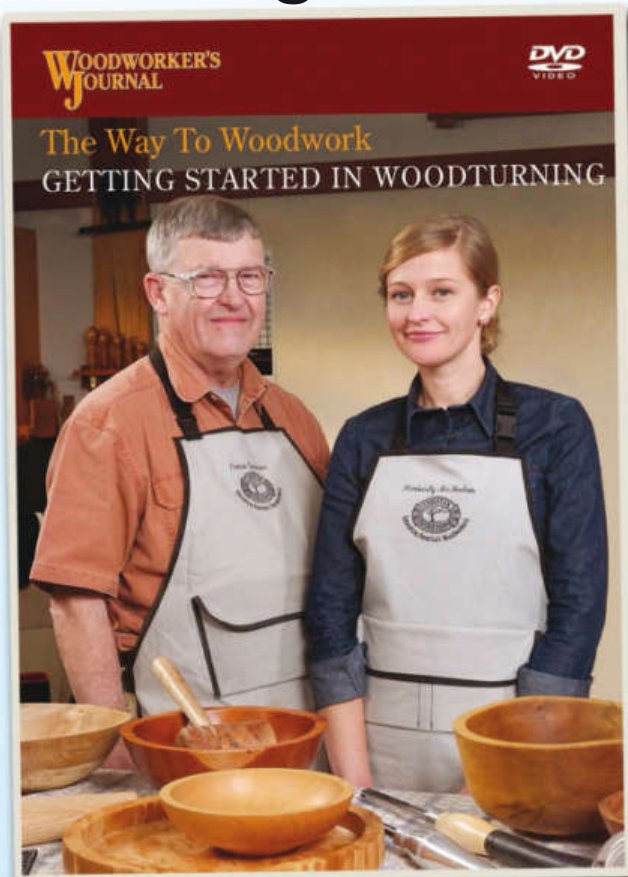
December 2015

For product information in the blink of an eye, visit www.woodworkersjournal.com and click on "Woodworker's Marketplace" under the Tools & Supplies tab.

ADVERTISER	Page No.	Web Address	ADVERTISER	Page No.	Web Address
1-800-BunkBed	61	www.1800bunkbed.com/wj	Laguna Tools	83	www.lagunatools.com
American Fabric Filter Co.	73	www.americanfabricfilter.com	Leigh Industries, Ltd.	9, 27, 57, 75	www.leighjigs.com
Armor Crafts	71	www.armorplans.com	Lignomat	51	www.lignomat.com
Armor Tool	17	www.armor-tool.com			www.moistureproblems.info
Axiom Tool Group, LLC	15	www.axiompprecision.com	McFeely's Inc.	51	www.mcfeelys.com
Badger Hardwoods of WI, Ltd.	71	www.badgerwood.com	Mirka Abrasives, Inc.	91	www.mirkawoodworking.us
Beall Tool Company	51	www.bealltool.com	Next Wave Automation	7	www.nextwaveautomation.com
Briwax	89	www.briwax.com	Osborne Wood Products, Inc.	11, 19, 73	www.woodencomponents.com
Calculated Industries	9	www.calculated.com/santa	PanelPro	23	www.panelpro.com
CMT USA Inc.	73	www.cmtusa.com	Penn State Industries	55	www.pennstateind.com
Cook Woods	87	www.cookwoods.com	Quickscrews International Corporation	23	www.quickscrews.com
The Craftsman Gallery	17	www.chipsfly.com	Rockler Woodworking and Hardware	57, 77	www.rockler.com
DR Leaf Vacuum	75	www.drleafvac.com	RYOBI	2	ryobitools.com/phoneworks
Eagle America	71	www.eagleamerica.com	Sarge Knives	59	www.rockler.com
Earlex	69	www.earlex.com	Sawblade.com	3	www.sawblade.com
Epilog Laser	13, 71	www.epiloglaser.com/wvj	SawStop	5	www.sawstop.com
Festool	92	www.festoolusa.com/sanders	SuperMax Tools	51	www.supermaxtools.com
Flock It! Ltd.	75	www.flockit.com	Teknatool International Group	27	www.teknatool.com
Franmar Chemical, Inc.	11	www.franmar.com	Triton Precision Power Tools	23	www.tritontools.com
Furniture Medic	13	furnituremedicfranchise.com	West Penn Hardwoods	75	www.westpennhardwoods.com
Gorilla Glue	9	www.gorillatough.com	Williams & Hussey Machine Co.	27	www.williamsnhussey.com
Granberg International	61	www.granberg.com	Wood-Mizer	11	www.woodmizer.com
Grex Power Tools	61	www.grextools.com	Woodline USA	59	www.woodline.com
Harbor Freight Tools	64, 65	www.harborfreight.com	Woodworkers Source	71	www.101woods.com
Howard Products, Inc.	19	www.howardproducts.com	Young Woodworkers Kit Club	87	www.kitclubsavings.com
Jantz Supply	61	www.knifemaking.com	ZAR	17	www.ugl.com
Knew Concepts	51	www.knewconcepts.com			
Kreg Tool Company	7	www.kregtool.com			

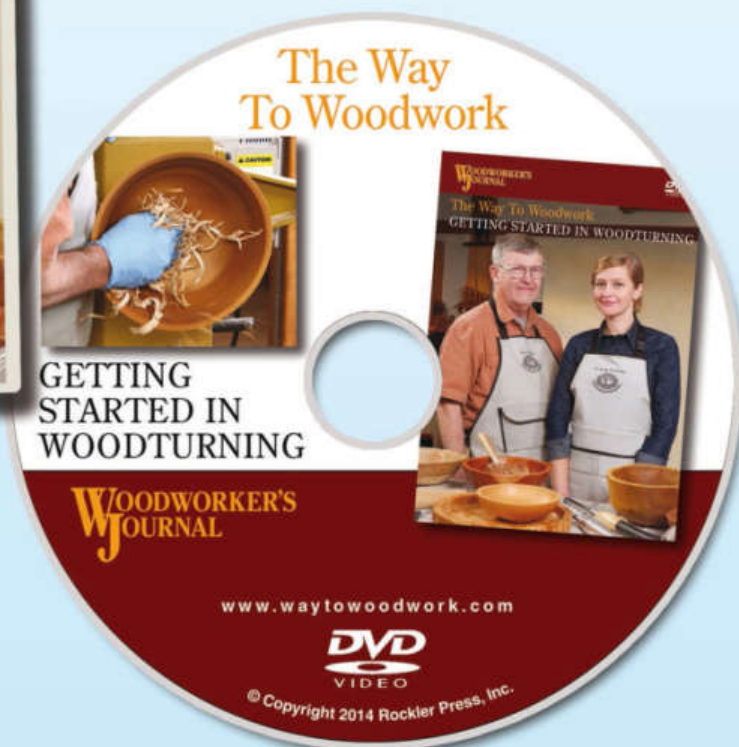
WOODWORKER'S
WJOURNAL *presents*

The Way To Woodwork: Getting Started in Woodturning



Woodturning is growing in popularity as people discover how inexpensive and easy it is to get started in this practical, fun and creative craft. This full-length DVD teaches everything you'll need to know to start woodturning safely and with more than enough knowledge to have fun right from the start.

And to make this DVD even more useful, we've added a bonus sharpening section to get you sharpening those curved tools perfectly!



BONUS
SHARPENING
SECTION!



**Order Yours
TODAY!**

**The Way to Woodwork:
Getting Started in Woodturning DVD-Video**
Item #57753 \$29.99

CALL **800-610-0883** (mention code **WJ1561**) or order online at www.woodworkersjournal.com/wj1561

**Sponsors
include ...**



ROCKLER®
WOODWORKING AND HARDWARE



Finishing Thoughts

Simple, Swift (and Safe) Finishes

By Michael Dresdner

Discover colorful ways to brighten up your trinkets, without taking a lot of time.



Michael Dresdner

is a nationally known finishing expert. He shares his expertise on the DVD *The Way to Woodwork: Step-by-Step to a Perfect Finish*, available through the store at woodworkersjournal.com.

Whether you prefer clear or colored coatings, you'll want a finish that is safe, simple, and swift for the variety of ornaments and gifts you make in the fall. After all, the holidays always seem to creep up faster than they should, and there's barely time to finish the project, much less apply a finish.

Here are some options that should make the season's work go more smoothly. But first, a word about safety.

Safe Finishes

Although most finishes contain toxic solvents while liquid, the ones I'm suggesting here are safe after they dry. That goes for food contact items and pretty much everything else. Shellac

is edible, as is mineral oil, which woodworkers typically use on cutting boards. Most everything else dries to an inert plastic film. Even drying oils, like boiled linseed and tung oil, form a stable film, albeit more slowly.

Before you ask, yes, there was a flap in 2007 concerning toys being recalled for having lead in the paint. However,

they were all traced to China. Here in the U.S., we removed lead from our paints in 1978, so even if you use wall paint for stain or coloring, you're not adding lead.

Clear Coatings

Shellac, lacquer and water-based coatings are all very fast-drying and easy to use, so they are great



It would be difficult to wipe a finish onto this ball-in-chain carving. Lacquer sprayed from an aerosol can, however, was ideal.

options. Shellac and lacquer will add some amber tint to the wood, which can be quite attractive, but water-based coatings usually are completely clear. That means they won't yellow even the lightest colored woods.

Any of these coatings can go over wood stains and dyes to act as a clear sealer. However, crystal clear water-based coatings are best over paint because they won't tint the colors underneath.

Dyes

For bright, translucent, see-through colors on wood, dyes are just the ticket. They are easy to use, and if you



Finishing with dyes allows the spalted wood on this egg puzzle to show through. It's best to seal dyes with a clear finish so they don't dissolve.

mix them in either water or alcohol, they dry very fast. You'll find dyes sold as mixable powders, as liquid concentrates and as pre-mixed dye stains you can use right out of the can.

Flood them on or dip small parts into the liquid dye solution, then wipe them off completely right away. Leave only what the wood has absorbed.

Because dyes can dissolve again even after they dry, it's best to seal them with a clear finish. Fortunately, any finish

will go over a dried dye, and even one coat will do the job. If you simply can't top coat, use alcohol-soluble dye with some shellac stirred in. The shellac will lock in the dye.

There is one exception. Some premixed or ready-to-use dye stains contain a binder, which means you would not need to seal them after use. If you are not sure what you have, seal it anyway. It can't hurt, and it's good insurance.

Continues on page 88 ...

Contact us

with your finishing questions by writing to Woodworker's Journal, 4365 Willow Drive, Medina, MN 55340, or by emailing us at: finishing@woodworkersjournal.com.

Please include your address, phone number and email address (if you have one) with your thoughts or questions.

Real Woodworking Kits for Kids 7-12 Years Old!

Get a great, new kit every 6 weeks with the YOUNG WOODWORKERS Kit Club!

These are real hammer-and-nails kits, with precut, pre-drilled wood, paint & more!

- Full-color, step-by-step, easy instructions.
- Learn practical skills.
- Develop confidence and a sense of accomplishment.
- Build supercool items.
- Satisfaction guaranteed or return kit and owe nothing.

FIRST KIT ONLY
\$8⁹⁹
(plus postage & processing)

Precut Kits!

Free Hammer!

Fun Projects!

YOUNG WOODWORKERS KIT CLUB

To find out more, visit: **KitClubSavings.com**



Featuring:

Live edge slabs · Custom Cutting
Oversize Bowl Blanks · Craft Wood
Unique Furniture Woods
& Much More



www.CookWoods.com
1-877-672-5275

Finishing Thoughts continued



Craft paints offer solid colors that don't need any top coat.

Paint

When it comes to versatility, water-based paint is king. Hit the shelves of your local hobby shop and you'll find a vast array of acrylic craft paints in two-ounce squeeze bottles. Not only are they available in every color imaginable, but

also in metallics, glow-in-the-dark, neon and exterior versions.

No craft store nearby? Visit your favorite paint or home store. Both interior and exterior paints are fair game, and you can get a quart or gallon mixed to any custom color. Many stores even offer 8 oz. sample jars, also available in custom colors, for about \$3.50, which, ounce for ounce, is decidedly cheaper than small bottles of craft paints.

Stain from Paint

Use paint straight from the container to apply bright, festive colors to any wood or to turn any water-based



You can use pearlescent and metallic paints, and even glitter, to add pizzazz.

paint into a pigment stain. It's easy: just reduce the paint by stirring in some water, anywhere from 10% to 50%, depending on the color you have and how rich a stain you want. Treat it just like any pigmented stain: apply it liberally, then wipe off as much or as little as you need to get the look you want.

Once it is dry, seal the stain with a coat or two of clear, water-based polyurethane to both preserve the color and add a bit of protection. Grab a can from your finishing shelf and brush it on, apply it with your favorite spray gun, or pick up an aerosol can of the same finish for quick and easy spray application with no gun cleanup needed.

Oils

Though they don't dry nearly as fast, many woodworkers like the ease and beauty of oils, especially on things like cutting boards and for dipping small parts. There are two distinct types: drying oils and non-drying oils.

Walnut oil, raw or boiled linseed oil, tung oil, and even Danish oil are all drying oils and will all form a film, though they dry at different rates. If you prefer non-drying oil, stick to mineral oil

and avoid cooking oils (olive, corn, canola, etc.) as they can turn rancid in time. Be aware that, while mineral oil looks nice initially, it will come off after being scrubbed a few times with soap and water.



The author created a pigment stain from paint reduced with water, then brushed on and wiped off to get the color he wanted for this bear's fur.

With all oils, the technique is the same. Either dip the part or flood the oil on liberally, let it sit and soak in for 10 or 15 minutes, then wipe off whatever has not been absorbed. As with all finishes, oils will dry faster in hotter air, so find somewhere warm and toasty to set the parts while they are drying.

Danish oil, which is actually a thin varnish, will dry overnight. Boiled linseed oil or tung oil will take two or three days, while raw linseed oil will take at least a week. Walnut oil, a poor choice in my opinion, may take a month or more, and it could cause problems for those with nut allergies.



Brightly painted colors in a gloss sheen give this clown attitude.



If you want a dull sheen on your project, use "chalk" paint, milk paint or ceiling paint. Softer colors by mixing in some white paint.

What's More Precious Than Silver or Gold?



**For All of
Your Projects that
Need Restoration!**

Most Precious Antiques



Treasured Acrylics



Heirloom Silverware



Finest Jewelry



Antique
Copper

Glass
& Brass



Fiberglass
& Chrome



BEFORE... AFTER!

The Difference Will Truly Amaze You!

Metal Polishes & Multi-Surface Restorers

Restores, cleans and polishes most all surfaces. **The Gold Standard Liquid Polish** contains a finer grade of jeweler's rouge and is safe even for your finest jewelry and plated metals.

For Best Result with These Polishes...

**Ultra-Magic Microfiber
Detailing Cloth** is the highest
quality available.



From the Makers of

For the
Quality-Conscious
Craftsmen
& Do-It-Yourselfers!



**Also the Finest
Antique Restoration
Wax in the World!**

To Order or Find a Retailer:
Briwax International, Inc.
1-800-5BRIWAX

For More Information:
BRIWAX.com

Available **ONLY** Through
Fine Woodworking Distributors
& Exclusive Retailers

HEY Did You Know?

Woodworking trivia: music to our ears

"Woody" Phillips has recorded two albums for Gourd Music, both featuring the instrumental stylings of woodworking tools and machinery such as table saw, jointer, drill press, 2x4s, vacuum, hammer and hand saw. "A Toolbox Christmas" features such traditional favorites as "Jingle Bells," "Joy to the World" and more. [Hear audio samples at www.gourd.com/toolbox.html]



What Does It All Mean?

A quick guide to terms from the world of woodworking.

Spalted: Lumber where natural decay has caused unique and attractive grain patterns

Zero-clearance insert: A plate mounted into a saw table that surrounds the blade such that there is virtually no clearance at the sides of the blade, used to minimize tearout

PSA: Pressure-sensitive adhesive; a peel-off backing on some sanding discs or veneer



Digital image courtesy of Dudarev Mikhail/Bigstock.com

African baobab trees, which look like a tiny tree atop a huge, fat trunk, store water in their trunks. Some larger baobabs have been found to have over 32,000 gallons of water stored in their trunks during the peak rainy season.

In the early days hollow logs were used as water pipes. In the event of a fire the fire department would dig and find the log, use an auger to bore a hole, and then pump out water to extinguish the fire. After the event, they would drive a wooden plug into the hole they had bored and re-bury the log. They would then place a



Photo courtesy of Platte Canyon Water and Sanitation District

marker indicating the location of this "fire plug" so they would not have to bore another hole for the next fire. For this reason, fire hydrants today are often still referred to as fire plugs.

Submit your own trivia ...

Send in a curious fact about your favorite topic and ours: woodworking. If it is selected for use, you will win an awesome prize!

Submit your Trivia to Woodworker's Journal, Dept. Trivia, 4365 Willow Drive, Medina, MN 55340. Or send us an email: trivia@woodworkersjournal.com

Your Trivia Test:

Q The unit of measurement for dust particles collected by your dust collector is the micron. How big is a micron?

The human eye can only see dust particles bigger than 10 microns. A micron measures 1/25,400".

Answer



Woody Glover of Trinidad, Texas, will receive a Senco FinishPro 23SXP 23-ga. Headless Pinner, 1 Gallon Finish & Trim Air Compressor (model PC1010N) and pack of 23-ga. Pins (item A101009) for having his contribution selected for the Trivia page.

**MIRKA**

Mirka® DEROS Makes Dust-Free Sanding Easy

Mirka's Dust-Free sanding system keeps your woodworking projects free of dust, allowing for a fast, clean job.

Start your project out right with the Mirka® DEROS, the first random orbital electric sander using advanced brushless DC motor technology, without the need for an external power transformer. Combine high performance and a longer product life by using Mirka's Abranet® abrasive. The patented NET construction means that no dust particle is more than 0.5mm from a dust extraction hole, eliminating the frustrating problem of dust clogging the abrasive. Paired with Mirka's Dust Extractor and hose, this system provides a dust-free sanding solution for any project.



For outstanding results on challenging applications use Abranet® Ace. Designed with optimized net construction and ceramic grains, Abranet® Ace offers superior cut and performance, while providing excellent dust extraction.



Mirka® DEROS Sander



Abranet® Mesh
Abrasives



Vacuum Hose



Dust Extractor

mirkawoodworking.us • mirkaderos.com • mirka.com

Mirka Abrasives, Inc. • 7950 Bavaria Road, Twinsburg, Ohio 44087 • tel 800-843-3904 • fax 800-626-6970

There are many sides to sanding.
We've thought of them all.



THE PERFECT SYSTEM



INTRODUCING THE FIRST BRUSHLESS FESTOOL SANDING SYSTEM.

Offering the performance of an air sander without the expense and bulk of an air system, these low-profile, long-life, and low-vibration sanders can run all day by limiting downtime caused by sleeve or brush replacements. Pair it with our seamless, integrated system of accessories, abrasives, carrying cases and dust extractors, and you've got the ultimate sanding system.

FESTOOL.
Tools for the toughest demands

View our entire line at
festoolusa.com/sanders